PRIME MINISTER'S DEPARTMENT
ECONOMIC PLANNING UNIT

AKADEMI SAINS MALAYSIA

WATER SECTOR TRANSFORMATION 2040

SUB-SECTORAL FINAL REPORT

ADVOCACY, AWARENESS, CAPACITY BUILDING AND PUBLIC PARTICIPATORY PLATFORMS (AACB)

(VOLUME II)



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WATER SECTOR TRANSFORMATION 2040 (WST2040)
ADVOCACY, AWARENESS, CAPACITY BUILDING AND PUBLIC PARTICIPATORY PLATFORMS (AACB)
(VOLUME II)

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FOREWORD

The Economic Planning Unit (EPU), on 3rd April 2020, appointed the Academy of Sciences Malaysia (ASM) as its strategic partner to undertake the Study on Water Sector Transformation Agenda 2040 (WST2040), to transform the water sector from an enabler to becoming a dynamic growth engine by 2040, as stated in the 12th Malaysia Plan (12th MP). This standalone Volume 2, "Advocacy, Awareness, Capacity Building and Public Participatory Platforms (AACB)", forms part of 9 compendia of reports. Volume 1, the Main Report, summarised the output of Volume 2 to Volume 9. The details in Volume 1, can be found in each of the 8 standalone reports.

The emphasis in all these reports is on achieving a secure, sustainable, and vibrant water industry in Malaysia, to forge it into a dynamic, efficient, sustainable, and revenue-generating industry. The five focussed areas of WST2040 are empowering people as the drivers of the transformation, strengthening governance, enhancing data-driven decision-making, ensuring sustainable financing and developing sustainable and cost-effective infrastructure. The Study, if the recommendations are followed when implemented, will contribute significantly to the national gross domestic product (GDP), create new job opportunities and facilitates the development of science, technology, innovation and economy (STIE), and will enhance the research, development, innovation and commercialisation (RDIC) of indigenous new products for both the national and global platforms. This transformation agenda is planned over 2 decades and 4 phases of four 5-year Malaysia Plans (MP), starting with 12th MP.

AACB is a game changer in the WST2040 Study and this Sub-Sector study aims to familiarise Malaysians with a better understanding on the water management concept and their roles and responsibilities to support the transformation. Recommendations from the AACB Sub-Sector study will lead in accelerating the adoption of the Integrated Water Resources Management (IWRM), the foundation of WST2040. Presently, trainings are mainly provided for professionals and are generally too technical for public understanding. Yet, water awareness programmes for the public need a step-up game to reach a larger target.

To achieve this ambition, we have partnered with expert advisors and researchers from multiple organisations led by UKM, and leverage on their knowledge and expertise, we were able to produce outputs and recommendations that, we believe, can improved the IWRM implementation in Malaysia. On behalf of ASM, I would like to take this opportunity to thank the AACB team headed by Dato' Professor Mazlin Mokhtar, FASc, for all their dedication, hard work, and commitment.

Thank you.

Ir. Dr. Salmah Zakaria FASc,
Chairperson, Project Management Committee WST2040,
Water Sector Transformation (WST2040) Study Team, EPU-ASM,
Chairperson, ASM Water Committee, 2015-2021

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PREFACE

Advocacy, Awareness, Capacity Building and Public Participatory Platforms (AACB) is one of the sub-sectors of the Water Sector Transformation 2040 (WST2040) Study of the Academy of Sciences Malaysia (ASM) in collaboration with the Economic Planning Unit (EPU), Prime Minister's Department of Malaysia.

AACB Sub-sector emphasises the role of the people, who is the main driver, to achieve the ambitious mission of transforming the water sector via accelerating the implementation of integrated water resources management (IWRM); enhancing usage of innovative water technology; achieving economy of scales; and in making Malaysia the Regional Water Hub over the 12th, 13th, 14th, and 15th Malaysian Plans (i.e. the year 2021 to 2040); with a special focus on five priority areas namely the People; Governance; Information; Finance; and Infrastructure.

Adopting the 'Business Unusual' approach, the AACB Sub-Sector is developing AACB IWRM Training Modules for the quadruple helix of stakeholders, namely: 1) Community, 2) Academia, 3) Business/Industry, and 4) Government; written by the Module Cluster Leaders (MCLs) from the Universiti Kebangsaan Malaysia (The National University of Malaysia; UKM).

Inputs and ideas from the various cluster of stakeholders, i.e. from staffs, personnel, professionals, and practitioners of ministries, agencies, private sector, academic institutions, business/industry associations, enterprises, Non-Governmental Organisations (NGOs)/Civil Society Organisations (CSOs), and numerous public interest groups have been very useful in helping the AACB Team to prepare the necessary reports/documents of AACB. Moreover, the insights and information from the speakers and participants at the various AACB webinars, workshops and meetings also have been effective in helping us to develop the reports and the AACB IWRM Training Modules.

I, hereby, would like to take this opportunity to express our sincere gratitude to all the contributors to this Malaysian Water Sector Transformation Study, especially the inputs and cooperation that had been extended to the AACB Sub-Sector Team.

Please do stay safe and stay productive during these challenging times.

Thank you all, once again.

Sincerely,

Prof. Dato' ChM. Dr. Mazlin Bin Mokhtar, FASc, FMIC.
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Water Sector Transformation (WST2040) Study Team,
EPU-ASM.

18 October 2021

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LIST OF ACRONYMS

AACB	Advocacy, Awareness, Capacity Building and Public Participatory Platforms
ABC	Active, Beautiful, Clean
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
ASM	Academy of Sciences Malaysia
BKSA	*Badan Kawal Selia Air* (Water Regulatory Body)
BMP	Best Management Practices
CBO	Community-based Organisation
CCIW	Climate Change Impacts on Water
CDD	Community Development Department (*Jabatan Kemajuan Masyarakat* – KEMAS)
CRED	Centre for Research on the Epidemiology of Disasters
CSO	Civil Society Organisations
CSR	Corporate Social Responsibility
DAN	*Dasar Agromakanan Negara* (National Agrofood Policy of Malaysia – NAPM)
DG	Director General
DID	Department of Irrigation and Drainage (*Jabatan Pengaliran dan Saliran* – JPS)
DMG	Department of Minerals and Geoscience
DOA	Department of Agriculture
DOE	Department of Environment
DOF	Department of Fisheries
DRR	Disaster Risk Reduction
DSAN	*Dasar Sumber Air Negara* (National Water Services Policy)
CEPA	Communication Education and Public Awareness
EPU	Economy Planning Unit Prime Minister Office
EIA	Environmental Impact Assessments
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussions
GEC	Global Environment Centre
GDP	Gross Domestic Product
GWP	Global Water Partnership

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HEIs	Higher Education Institutions
ICZM	Integrated Coastal Zone Management
IDM	Integrated Drought Management
ILBM	Integrated Lake Basin Management
IPCC	Intergovernmental Panel on Climate Change
IRBM	Integrated River Basin Management
IUWM	Integrated Urban Water Management
IWA	International Water Association
IWK	Indah Water Konsortium
IWRM	Integrated Water Resources Management
JBA	*Jabatan Bekalan Air* (Water Supply Department – WSD)
JKR	*Jabatan Kerja Raya* (Public Works Department – PWD)
JKT	*Jabatan Kerajaan Tempatan* (Local Government Department)
JMG	*Jabatan Mineral dan Geosains* (Department of Minerals and Geoscience – DMG)
JPBD	*Jabatan Perancangan Bandar dan Desa* (Town And Country Planning Department – TCPD)
KADA	Kemubu Agriculture Development Authority
KASA	*Kementerian Alam Sekitar dan Air* (Ministry of Environment and Water)
MRRD	*Kementerian Kemajuan Luar Bandar dan Wilayah* (Ministry of Rural and Regional Development – MRRD)
LESTARI	Institute for Environment and Development
LPP	*Lembaga Pertubuhan Peladang* (Farmers' Organisation Authority – FOA)
LSANK	*Lembaga Sumber Air Negeri Kedah* (Kedah State Water Resources Board)
LUAS	*Lembaga Urus Air Selangor* (Selangor Water Management Authority – SWMA)
MADA	Muda Agriculture Development Authority
MAFI	Ministry of Agriculture and Food Industries
MENGO	Malaysian Environmental NGO
MET	Meteorological Department
MFT	Malaysia Federal Territories
MHLG	Ministry of Housing and Local Government
MIGHT	Malaysia Industry-Government Group for High Technology
MLD	Millions of Litres per Day
MOA	Ministry of Agriculture and Agro-based Industry
MOH	Ministry of Health
MOHE	Ministry of Higher Education

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MOSTI	Ministry of Science, Technology and Innovation
MOT	Ministry of Transport
MPIC	Ministry of Primary Industry and Commodities
MSAN	*Majlis Sumber Air Negara* (National Water Resources Council – NWRC)
MSANg	*Majlis Sumber Air Negeri* (State Water Resources Council – SWRC)
MWA	Malaysian Water Association
MWIG	Malaysian Water Industry Guide
MyCapNet	Malaysian Capacity Building Network
MyCDNet	Malaysian Capacity Development Network
MyWP	Malaysian Water Partnership
MITI	Ministry of International Trade and Industry
NAHRIM	National Hydraulics Research Institute of Malaysia
NGO	Non-governmental Organisation
NIWR	National Integrated Water Research
NKEA	National Key Economic Area
NKPA	National Key Priority Area
NOSS	National Occupational Skills Standard
NPP	National Physical Plan
NRE	Ministry of Natural Resources and Environment
NRW	Non-revenue Water
NTP	National Transformation Programme
NWRP	National Water Resources Policy
ODR	Open Data Readiness
O&M	Operations and Maintenance
PAAB	*Pengurusan Aset Air Berhad* (Water Asset Management Company – WAMCO)
PES	Payment for Ecosystem Services
PPP	Public-private Partnership
PPP	Public Participatory Platform
PWSA	Penang Water Services Academy
R&D	Research and Development
RBIMS	River Basins Information Management System
RBMC	River Basin Management Committees
RBMU	River Basin Management Unit
RoL	River of Life
RUU	Rang Undang-Undang
RWP	Regional Water Partnerships
SDG	Sustainable Development Goal
SME	Small- and Medium-enterprises
SOM	Service-oriented Management
SOP	Standard Operating Procedures

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SPAN	*Suruhanjaya Perkhidmatan Air Negara* (National Water Services Industry Commission)
SSL	Self-sufficiency Levels
STI	Science, Technology and Innovation
SSH	Social Science and Humanity
SWMA	Selangor Waters Management Authority
SWRA	State Water Resources Agencies
SWRE	Sabah Water Resources Enactment
TMDL	Total Maximum Daily Load
TNB	Tenaga National Berhad
TOT	Training of Trainers
UKM	Universiti Kebangsaan Malaysia
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Conference on Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WEF	Water, Energy, Food
WEM	Water Engineering and Management
WF	Water Footprint
WFD	Water Framework Directive
WHO	World Health Organisation
WMA	Water Management Authority
WQI	Water Quality Index
WRDC	Water Research and Development Centre
WRM	Water Resources Management
WSIA	Water Services Industry Act
WSM	Water Supply Management
WSWWM	Water Supply and Wastewater Management
WST2040	Water Sector Transformation 2040
WTP	Water Treatment Plant
WUGs	Water User Groups
WWF	World Wide Fund

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EXECUTIVE SUMMARY

In preparing the groundwork for the period of the 12th MP and beyond, the Economic Planning Unit (EPU), Prime Minister's Department, had prepared a Strategy Paper in collaboration with the United Nations Development Programme (UNDP) as a strategic partner and assisted by a Drafting Committee, comprised experts with vast experience in the water sector, both from the Government agencies and non-Government organisations nationwide through extensive stakeholder consultations (ASM 2021a).

In the Strategy Paper, EPU described the Way Forward as a National Agenda for Malaysia's Water Sector Transformation (WST2040), planned to be undertaken in 4 phases over 20 years, beginning with the 12th MP (2021-2025) and ending with the 15th MP (2036-2040). In this context, the 12th MP also represents the first half of the nation's Shared Prosperity Vision 2030 which is a stated commitment to ensure Malaysia achieves a sustainable growth in tandem with equitable distribution across income groups, ethnicities, regions, and supply chains (ASM 2021a).

The WST2040 has two basic objectives as follows (ASM 2021a):

1. WST2040 is to ensure that water security and sustainability nationwide, in line with global and national targets, continues to be fulfilled beyond 2040 where there is a water supply for all.
2. WST2040 aims to transform Malaysia's water sector from being one of economic enablers to a dynamic economic sector as a growth engine that can contribute to the country's Gross Domestic Product (GDP), generate revenue, increase efficiency in water management as well as provide enhanced employment opportunities in the water sector and drive the country's science, technology and innovation in the water arena.

Considering that WST2040 is a national economic agenda, for the 12th MP, the study had identified 2 Strategic Shifts as follows (ASM 2021a):

1. Accelerating implementation of IWRM (Integrated Water Resources Management).
2. Transforming the water sector from an Economic Enabler towards becoming a dynamic growth via the national agenda on Water Sector Transformation 2040.

and the 5 Strategies are as follows:

1. Empowering People in Transforming the Water Sector
2. Strengthening Governance at all levels
3. Enhancing Capacity in data-driven decision-making
4. Strengthening financing capacity
5. Developing sustainable infrastructure and cost-effective technology

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Meanwhile, for the 13th MP, 14th MP and 15th MP, the study had identified strategic shifts as follow:

13th MP: Uplifting Indigenous technology at par with international standards.
14th MP: Achieving economics of scale.
15th MP: Becoming the regional water hub.

To develop a comprehensive roadmap, EPU has engaged the Academy of Sciences Malaysia (ASM) to prepare a complete National Agenda Roadmap on the Transformation of the National Water Sector 2040 (Roadmap WST2040). The EPU-ASM WST2040 consists of 8 Sub-Sectors, as below (ASM 2021a):

1. Advocacy, Awareness, Capacity Building and Public Participatory Platforms (AACB);
2. Integrated Water Sector Data Centre (IWSDC);
3. IR 4.0 in the Various Water Sub-Sectors (IR4.0 WS);
4. Water-Food-Energy Nexus (WFE);
5. Virtual Water and Water Footprint (VW&WF);
6. Climate Change Impact and Adaptation (CCIA);
7. Alternative Water Financing (AWF); and
8. Water as an Economic Sector (WES)

The current rapid trend of urbanisation, development, industrialisation, and population growth has increased the water demand and supply in Malaysia. Simultaneously, this development has severely impacted the water conditions in terms of water quality and water quantity. Therefore, this situation showed the cruciality of water sector transformations. There is a need for Malaysia to conserve and manage its water resources to ensure an adequate and safe water supply. This effort is also required to ensure water sustainability while protecting and restoring the environment in Malaysia (ASM 2021b).

The past decade has seen rapid development and tremendous efforts on water sector transformations. Malaysia launched the National Water Resources Policy in 2012 to transform the paradigm of water sectors. Moving forward, Malaysia with the initiative to lift the effort on water sector transformation, adopted the Integrated Water Resources Management (IWRM) which has also been embodied in the National Water Resources Policy. The adoption of IWRM demonstrates a strong move from past fragmented and sectoral management practices (ASM 2021b).

However, the water resource management in Malaysia has been sectoral and fragmented for decades. Although there have been tremendous efforts and programmes being carried out, however, the inadequate understanding and awareness especially amongst public participatory platforms on water sector transformation being the hindrance of meaningful implementation of IWRM in Malaysia. This has caused the slow movement on the development of water sector transformation. The ownership of "water is essential in our life" or "water is part of our life" still cannot be interpreted and embodied by Malaysian. Thus, it is necessary to make progress in rationalising individual sectorial policies. By doing this, it will help Malaysia to strategise the planning to achieve the goals and eventually it can identify any gaps in the implementation and enforcement of IWRM (ASM 2021b).

The improvement is also required for AACB Sub-Sector to convey the message that it is necessary to bring people nearer to water to create awareness, change in behaviour and to develop a feeling of better respect towards water, including protecting and conserving it.

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Based on observations, there are three significant approaches to highlight the importance of water to society: 1) Sustainable Development Goals, i.e. SDGs, 2) Disaster Risk Reduction, i.e. DRR, and 3) Estimating the economic value of ecosystem services.

Therefore, there is an urgent requirement for water sector transformation on AACB to be developed and implemented efficiently. This includes the training and education programmes, module and material development, communication, and delivery system, to improve the current water management system and practices in Malaysia (ASM 2021b).

Advocacy is a process of supporting and empowering people to be able to implement Water Sector Transformation,[1] which includes communicating their opinions, ideas, and concerns towards a better recommendation. Advocacy is also a process that provides the availability for the public to access information and services, protecting and promoting their rights and responsibilities, and discovering choices and options toward better implementation of water sector Management (ASM 2021b).

Generating awareness is crucial to provide the knowledge and information related to water sector transformation. This is also crucial to change the perceptions and ideas on water usage and facts related to water. All these can be done by continuous awareness or campaign through mass media or water-related programmes, education, and participatory processes, then translating this awareness into more sustainable and meaningful development outcomes. The awareness should be able to change the public perspective and familiar with the water management concept and their roles and responsibilities to support this effort (ASM 2021b).

To ensure the sufficiency and development of the capacity of various stakeholders, capacity building is very crucial. This is to ensure a certain level of improvement and enhancement of knowledge, experience, and expertise in specific fields is achieved. At many levels in the process, even at the governmental level, it can be found that stakeholders lack the necessary knowledge and skills for a full and effective participation. Capacity building categories include education and awareness-raising about community needs, information resources for policymaking, regulations and compliance, basic infrastructure, and market stability, as well as technical capacities including practical knowledge and action in specific science and social aspects (ASM 2021b).

Hence, the AACB Sub-Sector has been established under EPU-ASM WST2040 with the objectives including:

1. Recommendation of a management plan to the government for better enforcement of IWRM policies.
2. To benchmark businesses and industries' current water management practices towards sustainability and to act responsibly in managing their water resources throughout the value chain.
3. Instilling a sense of ownership amongst them towards their rivers and engaging in effective participation towards ensuring a sustainable management of their river basin.
4. Incorporating academic knowledge to support sustainable water resource management.

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[1] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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Based on the objectives above, AACB has established 4 clusters, namely Government Cluster, Business & Industry Cluster, Community Cluster, and Academia Cluster. The roadmap of AACB WST2040 has been proposed based on the clusters, respectively. It has been developed based on the gaps identified through the policy review, literature review, qualitative research, and stakeholder's engagement.

In line with EPU's terms of reference, AACB sub-sector's scope of the study is to:

1. Review and analyse current policies with a view of improvement for the meaningful implementation of IWRM towards WST2040.
2. Undertake comparative strategy analysis/business models with other nations.
3. Study and consider the current global markets towards making the water sector a dynamic new economic sector capable of driving the nation's GDP growth in the future. Therefore, AACB Sub-Sector will focus on the following issues:

    i. Public Participatory Platform (PPP)
    ii. Training Modules (based on Quadruple Helix Model)

4. Prepare a transformation strategy and initiative implementation framework for each of the 4 Phases including the Implementation Agencies, Estimated Budgets and Main Target Achievements Based on the Analysis Undertaken and Expert Reviews with the progress of the study.
5. Undertake consultations with stakeholders and experts to finalise the proposed strategies and initiatives of the nation's Water Sector Transformation.
6. Prepare a complete Roadmap for the National Agenda on the Water Sector Transformation 2040 for the various Ministries' and Agencies' information and guidance for the implementation of programmes and activities towards achieving the targeted Transformation objectives.

To analyse the level of effectiveness of the water management in Malaysia, AACB Sub-Sector has reviewed 26 Policies and Management plans and did some comparison with water management styles of eight countries and one international organisation, namely the United Kingdom, Mekong River Commission, the Philippines, South Korea, Singapore, Finland, Australia, Sweden, and Germany; 92 existing Public Participatory Platforms (PPPs); and looking through several existing water-related awareness and capacity building modules. This report lists out, analysed and identified some of the gaps related to the important elements stated earlier. A total of forty-four stakeholders' engagement has been conducted involving quadruple helix stakeholders. This involved twenty-three field visits, six webinar series, two workshops, two focus group discussions and eleven meetings.

AACB Sub-Sector expects and hopes that the WST2040 will produce much more effective awareness, advocacy, and capacity building programmes, projects, and plans of IWRM and its related sub approaches. Understanding that the capacity building will be focussing on two important sectors, i.e. institutions and communities. AACB Sub-Sector is very much exploring the process of how to make public participatory platforms work more effectively, and to be sustained over a longer period. This capacity-building development approach will be focussing on the collaboration of state and local government agencies, local communities, and local universities, schools, and other centres of learning and education, plus partners at various levels and scales.

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Based on some preliminary analyses, the key findings based on the five areas can be summarised as the following:

A. People (AACB; PPPs)

1. Trying to understand the ongoing issues of AACB and sustaining a good level of vigour amongst the different kinds of PPPs.
   Even though there had been quite a good number of awareness campaigns and initiatives being conducted, nevertheless the level of awareness amongst stakeholders was still found to be relatively low. Many water issues are still happening such as water wastage, and water pollution. Awareness-raising activities are needed to help inform and sensitise decision-makers including those who are in the sectors such as agriculture, energy, health and safety, and finance; about water-related challenges.

   Advocacy: There is a need to use certain awareness raising strategies to serve as a key method for informing policymakers, the public and academe about the benefits of IWRM, water resources sustainability, and economic sustainability too.

   Capacity building: training, knowledge sharing, generation and dissemination of knowledge, can take place through formal, non-formal and informal educational training.

   Public Participatory Platforms: There is a need to institutionalise community involvement in the various kinds of Public Participatory Platforms.

2. Roles of the quadruple helix stakeholders in supporting the WST2040 and contributing to public participatory platforms are important to ensure a successful community participation in IWRM implementation.

   Involvement of the quadruple helix stakeholders as important actors on the public participatory platforms will be vital for the successful implementation of IWRM. There are four main clusters of stakeholders, namely Government, Academia, Community, and Business & Industry.

   These four main stakeholders have common and differentiated roles and responsibilities to be put into practice. They should be made aware of their roles, potential contributions and how to overcome some of the challenges in implementing IWRM.

3. Capacity development of institutions and communities is required to strengthen public participation in IWRM.

B. Governance (Policies, Legislations, Regulations, Institutions, and Guidelines)

The water resource management in Malaysia has been sectoral and fragmented for decades. Although several programmes and training have been developed at government, community, academia, and business & industry levels to create awareness on the importance of water management to support the national policies, there is still a general lack of understanding on water management especially IWRM. Hence, the development towards water sector transformation has been quite a challenge. Thus, there is an urgent need to make progress in streamlining the individual sectoral policies. By doing this, it will help each department to achieve their goals and they can identify any gaps in the implementation and enforcement.

The importance of water management was emphasised in some of the national policies. There were strategies, and plans relating to water-related awareness-raising, advocacy, capacity building and public participatory platforms. Many of the existing programmes have an emphasis on the involvement of all levels

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of the community via the collaboration of quadruple helix stakeholders which are Government, Community, Business & Industry, and Academia.

However, several national policies only emphasised water supply and demand, and infrastructure on water supply and drainage to ensure national food security. For instance, "Dasar Agromakanan Negara" focusses mainly on sufficient quantity and high quality of water for agriculture. No awareness, advocacy and capacity building mechanism and tools of water management was embedded in some of the policies being looked at. The role of water in development is not recognised fully in this policy.

Some policies are lacking in terms of risk assessment and management. To quantify and estimate the true value of water, the policy needs to include the risk management and assessment of water resources and other related resources. In water planning, risk management can provide useful information for assessing the risks, and gauge to a certain extent the community values, and fulfil management objectives. The risk management conducted will ensure sufficient and sustainable water resources for the maintenance of human health, water-related economy, environmental health, and today's lifestyle. Risk assessment also aims to facilitate informed decision making for a sustainable water supply for all types of use.

C. Information and RDIC (Information, Planning, O&M, Research & Development)

Malaysia was ranked 34th by the World Justice Project's Open Government Index in 2015. Responses from Malaysian household surveys and questionnaires indicated that disclosure of government information to the public is prohibited and if allowed, it is much limited and controlled. Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) had reported a low degree of willingness to share information and data amongst government agencies in 2010. A study on open data readiness (ODR) conducted by World Bank Group (2017) had found some gaps in data availability in Malaysia.

1. Accessibility to data is challenging and remains an area of concern amongst data users in Malaysia. The Official Secrets Act (OSA) 1972 binds government officers, and data and information sharing are much controlled and regulated. Thus, the legal framework needs to be reviewed by relevant expert authorities to improve the situation.
2. Malaysian government agencies and ministries are active in collecting and analysing data, but these data are generally not made public. There are still limitations and challenges existing in inter-agency data exchange and sharing, and in making some data publicly known.
3. There is some sort of a data conundrum situation in Malaysia. Several institutions that are monitoring the performance of countries in matters about SDGs and as such, are still reporting that the relevant data and information needed about Malaysia is still limited, and at times being reported as being not available. But of late, the Department of Statistics Malaysia is seen to be more forthcoming in dealing with the situation and had been quite proactive of late in collating and sharing information about various aspects of the country, including in data and information related to the 17 SDGs and 169 targets in which some data about IWRM are also included.

In Malaysia, data that are relevant for IWRM implementation at various levels and scales are collected and recorded by several government institutions and agencies across different ministries. These institutions collected and managed data and information on water resources, but accessibility and sharing of these data with different sectors of the community are much controlled. Generally, it is not easy to obtain certain specific data for decision making by an authority if these data are not measured and collected by that

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authority themselves. Inter-agency and inter-sector sharing of data and information about IWRM is still quite a challenge in Malaysia.

D. Infrastructure, facilities, and legal instruments.

1. A limited number of water training centres.

   Currently, there is only a limited number of IWRM training centres around the country, thus, the training about IWRM amongst the community is much limited. The relevant authorities and other stakeholders concerned need to find better ways and strategies to step up the rate of IWRM training, and understanding amongst all sectors of the population, and communities.

2. Capacity building during Covid-19 pandemic situations.

   The Covid-19 pandemic has indeed affected modalities of delivery of training materials and capacity development activities around the world (UNESCO, 2020). Some critical components of awareness-raising, advocacy and capacity-development activities would include the need to identify the appropriate ways of combining the instruction and discussion via online platforms, face to face interaction, hands-on experiences sharing, etc.

3. Training programmes based on IWRM modules.

   Personnel involved in water resource management, and water services provision at Federal and State levels, and their partners and collaborators, at various levels and scales are anticipated to request and demand appropriate training on IWRM. The trainings including those that are based on IWRM modules are linked to several SDGs and other integrated and holistic approaches toward sustainable development like geoparks, ICZM, biosphere reserves, world heritage sites, etc. To strengthen the public participation, training programmes based on IWRM modules are required to enhance the capacity of quadruple helix stakeholders namely the Government, Academia, Business & Industry, and Community & NGOs.

E. Finance (Economic and Financial Instruments)

Since water management has been sectorised and fragmented, the funds and financial help are also sector-based. Therefore, some awareness, advocacy and capacity building programmes for water management can also be based on the corporate social responsibility initiatives of industries and businesses. The current funds and finance (Economic and Financial Instruments) for AACB and PPPs, including via funds from government (at both federal and state levels), private business & industry through corporate social responsibility (CSR) programmes, NGOs/CBOs, crowdfunding and other kinds of sponsorship too. There is a need for a sustainable flow of funds for AACB towards IWRM.

Based on the findings, the recommendations are as follows:
Empowering People in Transforming the Water Sector

- Strengthening AACB and PPPs in Malaysia via AACB WST2040 programmes based on the quadruple helix model, i.e. comprising the main four clusters of stakeholders namely the Community & NGO; Business & Industry; Government; and Academia. It is suggested that relevant agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform.

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- Empowering people and developing capacity building via the Quadruple Helix (Government, Business & Industry, Academia, Community) with IWRM and IRBM knowledge using several communication strategies.[2] Capacity building and continuous improvement of stakeholders can be strengthened via enhancing communication skills, river care knowledge, and environmental subjects. Soft skills training on public outreach will enhance the awareness and capacity of all stakeholders. Moreover, enhancing the River basin understanding of the government officials will be effective via developing awareness that is in line with IWRM, IRBM, ICZM, etc. Enhancing and promoting river address, developing a simple brochure, video, etc. will also enhance the awareness of the civil servants on IWRM.

- Reiterate importance of rivers as water resources for human and the environment at school. The topics related to water have been incorporated into school's curriculum, this includes the syllabus of preschools, primary and secondary schools. This means that the topics are related to water have already being part of the formal education. However, it is possible that students might have forgotten or still not aware that water actually come from the rivers. In this regard, teachers should be trained and retrained, where they should learn more case studies related to river management, thus they can share these case studies with students when teaching water related topics in the syllabus. A strong TVET ecosystem will be a game changer that will create future-ready talent in meeting the industry demand. In this regard, there is a need to incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers.

- Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management. Researchers at HEIs have vast experience in research, training and consultation, hence they should share their expertise with stakeholders, namely government, industry and community. For example, the Open University Malaysia used to offer a Master Course on IWRM, hence it is timely to review the course, and offer the course again to the public. For government, researchers can provide technical inputs as subject matter experts (SMEs) to government officers, as well as to represent Malaysia or assist government officials in international and regional negotiations. Besides, researchers can also become the memory keeper for the relevant ministry/agency to ensure sustainable knowledge transfer. For industry, researchers can work closely with professional bodies to provide professional training courses or become consultants/technical advisors to selected industries. As far as community is concerned, researchers can take the leadership and proactive measures to outreach to the communities. Besides, researchers can also promote the concept of citizen science to enhance community engagement in sustainable water resources management.

- Enhance PPPs and AACB Through Digital Learning Spaces. It is recommended for Malaysia to leverage the pervasiveness of technologies to serve the greater cause of water resource management. To adopt suitably advanced medium technology to spread awareness to the IWRM stakeholders.

- To activate and empower the existing environmental volunteers and community-driven programmes e.g.: *Rakan Alam Sekitar*, Friends of River and updated them with info/status on IWRM in their community. Community-driven programmes in environmental conservation need to be increased to empower people

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[2] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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to protect and conserve water resources as well as create socioeconomic activities. Various successful initiatives including the Tagal system and FoR programmes will also be expanded. Campaigns to inculcate water-saving habits and precise water use amongst domestic users and farmers will be intensified through community platforms such as *Kumpulan Pengguna Air*.

Strengthening Governance at all levels

- Strategic alliances with renowned regional and international water research and training centres. The National Research and Capacity Building institutes to enter into strategic alliances with renowned regional and international water research and training centres. Regular participation in reputed water-related international water fora by the civil servants will enhance their leadership skills and capacity in water management.

- Collaboration with government agencies and relevant stakeholders. Partnerships between agencies and joint programmes between government sectors as well as collaboration and smart partnership help build linkage to enhance knowledge and help foster connectivity between agencies to develop a common sense of ownership.

- Appropriate tools that can be used by government officers and local community to monitor the river water quality. Local government should be given the appropriate tools/applications/software to measure/monitor the quality and quantity of the waters under their jurisdiction. The locals should also be the first person to report the water issues.

- AACB training module to enhance stakeholders' leadership roles and facilitate enforcement of policies and laws for better water governance. AACB training module aspires to enhance stakeholders' leadership roles to facilitate the enforcement of policies and laws for better water governance including to minimise future disaster from man-made and natural sources.

- Role of local government serves as an important mechanism to further the policies and to facilitate the implementation of relevant strategies and programmes of the federal and state governments especially on Disaster Risk Reduction (DRR). Incorporate IWRM in the local plan, hence future development will minimise the impact on the river basin.

- Enhance leadership of government officers especially at local and district levels in moving and realising the IWRM via quadruple helix mode via practices and activities supported by a good flow of scientific data and information. One of the game changers or tipping points for AACB Sub-Sector in making the WST a reality and to be matched by political will via the involvement of parliamentarians of Malaysia via their All-Party Parliamentary Group Malaysia (APPGM).

Enhancing Capacity in data-driven decision-making

- Integrated and comprehensive data-sharing framework. IWRM should have an integrated and comprehensive data-sharing framework to accelerate its implementation in Malaysia. Information and data are very crucial in IWRM especially in AACB and PPPs as it can facilitate the stakeholder's communication and participation and supporting in decision making.

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- Mapping of stakeholders for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information. There should be an effective mapping of stakeholders for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information to ease the decision-making processes for IWRM. This will ensure the flow of reliable data and information from relevant agencies to the local government for IWRM.

- Developing and promoting platform for government officials and relevant stakeholders in IWRM. The platform allows any water agencies, water organisations and local communities to share data and information, propose new projects and garner interest amongst potential partners. Facilitating new partners and collective action through collaboration approach.

- Continuous RDIC for National Integrated Data Bank. Continuous RDIC (i.e. research, development, commercialisation and innovation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDIC will effectively facilitate the real time decision making of stakeholders especially at the local level to promote decision-making processes quickly. In this regard, the stakeholders mapping, series of dialogue and consultations amongst the federal, state and local level stakeholders will also justify the use of real time data and information coming from RDIC for IWRM.

- Establish IWRM information centre such as Pusat Informasi Sungai at community or Information corner such as at religious institutions, surau and churches, local authority offices, tourist information centres, schools and universities.

- To mainstream water resource management as one of the priority research areas in RDIC. It will enhance the roles of researchers and academia from higher education institutions (HEIs) in promoting sustainable water resources management.

- To establish a database of resource persons (Government, Business & Industry, Academia, Community) in the field of water resource management. The resource persons of IWRM to build the capacity of stakeholders via training.

Strengthening financing capacity

- Adequate funds for non-structural capacity building towards IWRM, comprehensive AACB program at the PPPs, finance for the pool of water experts to advocate IWRM and training future water leaders using the facilities at the National Training Centres.

- Incentives and award should be provided for the green watershed restoration and nature-based solutions. It is recommended for Malaysian Investment Development Authority (MIDA) to introduce a new category in Green Incentives that is related to water management project. This recommendation aims to encourage more stakeholders to adopt and implement water management project in their respective premises and operations, for example, water reuse and reclamation for non-portable purposes. Any investments in this area to enable business and industry to adopt these practices should be given tax incentives. Besides, Ministry of Finance (MOF) and Inland Revenue Board of Malaysia (LHDN) should also give tax incentives to business and industry that managed to protect and upgrade the condition of the nearest water body for instance the company's tax exemption will be given to business and industry entities, especially to companies for their involvement and contribution in conserving water resources.

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- Green incentives and certification for AACB WST Training attendees. Green incentives and certification, and recognition should be given to the SMEs for attending the AACB WST Training program before water servicing licensing and relicensing.

- Ensure balanced fiscal federalism, and carrot-and-stick approach to local government. Continuous Federal funding also is very vital for the rehabilitation and restoration of river basin management. AACB training programme will enhance the leadership roles of civil servants for rehabilitation and restoration of river basin management. Federal funding is the main strength to adopt the green economic approaches for IWRM in Malaysia. Therefore, adequate green funding along with training will encourage civil servants for sustainable water resources management while applying green economic approaches such as 'payment for ecosystem services', application of 'polluter pays' principle, and uniform pricing model for water resources, and as such. Moreover, water-based recreation and tourism activities via AACB training programme will also encourage local authorities to promote local level income generation while incorporating the local communities.

Developing a sustainable infrastructure cost-effective technology

- Establish IWRM training centres such as Pusat Informasi Sungai and others should have adequate online/ on-site facilities and water experts. The training centre serves as a platform for public participation by coordinating and managing the existing and new public participatory platforms.

- The roadmap of AACB WST2040 were proposed based on the recommendations. It was developed bases on the gaps identified through the policy review, literature review, qualitative research, and stakeholder's engagement. The Road Map is for implementation over a 20-year time frame spanning four Malaysia Plans until 2040. The recommended strategies have been organised following the 5-focus areas under four discrete elements.

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1.0 INTRODUCTION OF AACB SUB-SECTOR

Over the past decades, water development has been the foundation of socio-economic development in Malaysia. Malaysia is blessed with water resources, such as numerous systems of rivers, oceans, islands, rainfalls. The current rapid trend of urbanisations, development, industrialisation, and population's growth has increased the water demand and supply in Malaysia. Simultaneously, this development has severely impacted the water conditions in terms of water quality and water quantity. Meanwhile, the rising issues of water pollutions have been addressed by many researchers. This situation has led to the situation where the water supply situation for the country has changed from one of relative profusion to one of inadequacy (Rahman & Khalid, 2009). Therefore, this situation showed the cruciality of water sector transformations. There is a need for Malaysia to conserve and manage its water resources to ensure an adequate and safe water supply. This effort is also required to ensure water sustainability while protecting and restoring the environment in Malaysia.

The past decade has seen a rapid development and tremendous efforts on water sector transformations. Malaysia launched National Water Resources Policy in 2012 to transform the paradigm of water sectors. There is a large volume of published studies describing the issue and challenge of the implementation and practicability of this policy. Moving forward, Malaysia with the initiative to lift the effort on water sector transformation, adopted the integrated Water Resources Management (IWRM) which has also been embodied in the National Water Resources Policy. The adoption of IWRM demonstrates a strong move from past fragmented and sectoral management practices. Besides, Malaysia also endorsed the United Nation's Sustainable Development Goals (SDGs) on water security for the effective implementation of IWRM at all levels (i.e. national, regional and local) before the year 2030 (Rahmah et al., 2019).

However, the water resource management in Malaysia has been sectoral and fragmented for decades. Although there have been tremendous effort and programmes being carried out, however, the inadequate understanding and awareness especially amongst public participatory platforms on water sector transformation being the hindrance of a meaningful implementation of IWRM in Malaysia. This has caused the slow movement on the development of water sector transformation. The ownership of "water is essential in our life" or "water is part of our life" still cannot be interpreted and embodied by Malaysian. Thus, it is necessary to make progress in rationalising individual sectorial policies. By doing this, it will help Malaysia to strategise the planning to achieve the goals and eventually it can identify any gaps in the implementation and enforcement of IWRM.

Therefore, there is an urgent requirement for water sector transformation on awareness-raising, advocacy, and capacity building to be developed and implemented efficiently. This includes the training and education programmes, module and material development, communication, and delivery system, facilities establishment, and appropriate governance mechanisms to improve current water management system and practices in Malaysia. This effort has been embodied in the current IWRM. Presently, water-related training is mainly provided by NRE, KeTTHA, MOA and Water Operators along sectoral lines and targeted mainly at their personnel. However, the main issues of the current implementation of water sector transformation especially in Awareness-raising, Advocacy and Capacity Building has been sectoral, and yet to reach all hierarchy levels in Malaysia.

One of the key success to implement the Water Sector Transformation is Advocacy, Awareness, Capacity Building and Public Participatory Platforms (AACB), which required involvement from all levels and

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stakeholders.[1] Generating the public awareness is crucial to provide the knowledge and information with relates to water sector transformation. This is crucial to change the perceptions and idea on water usage and facts related to water. This all can be done by continuous awareness or campaign through media mass or water-related program, education, and participatory processes, then translating this awareness into more sustainable and meaningful development outcomes. The awareness should be able to change the public perspective and familiar with the water management concept and their roles and responsibilities to support this effort.

Meanwhile, Advocacy is a process of supporting and empowering people to be able to implement Water Sector Transformation, which includes communicating their opinions, ideas, and concerns towards a better recommendation. Advocacy is also a process that provides the availability for the public to access information and services, protecting and promoting their rights and responsibilities, and discovering choices and options toward better implementation of water sector management.

To ensure the sufficiency and developing the capacity of various stakeholders, Capacity Building is very crucial. This is to ensure a certain level of improvement and enhancement of knowledge, experience, and expertise in specific fields is achieved. At many levels in the process, even at the governmental level, it can be found that stakeholders lack the necessary knowledge and skills for a full and effective participation. Capacity building categories include education and awareness-raising about community needs, information resources for policymaking, regulations and compliance, basic infrastructure, and market stability, as well as technical capacities including practical knowledge and action in specific science and social aspects.

In Malaysia, Awareness, advocacy, and capacity building for Water Sector Transformation (WST) have been widely implemented, ongoing, long yet interesting journey over the last two decades. The initiatives such as the Malaysian Water Partnership (MyWP), the Malaysian Capacity Development Network (MyCDNet, formerly known as Malaysian Capacity Building Network for IWRM, MyCapNet), UNESCO-International Hydrological Programme (IHP) Malaysia and the Academy of Sciences Malaysia (ASM) have implemented various programmes with the involvement of important agencies and ministries in Malaysia, universities, professional bodies, non-governmental organisations (NGOs), as well as the communities. These efforts have been massively done and praised. However, Malaysia needs more on the Water Sector Transformation. There is a need to change paradigm of awareness, advocacy and capacity building in water sector transformation towards a sustainable development in Malaysia. However, for the Water Sector Transformation 2040, Malaysia needs to change the paradigm on water awareness, advocacy and capacity building tactics towards more sociable water management to embrace a sustainable development. Thus, in the WST2040, AACB Sub-Sector (AACB Sub-Sector) is undertaking the 'Business Unusual' mission for this purpose. Programmes development and modules which will change citizens' lifestyle to be more proactive regarding water management and disaster which will lead to the generative situation that will make water essential for everybody's business. Thus, in the WST2040, AACB Sub-Sector (AACB Sub-Sector) is undertaking the mission of awareness-raising, advocacy and capacity building matters related to water resources management which is 'Business Unusual'.

Awareness - raising - normal definition - building a common understanding of the shared value and knowledge/ issues (if any) of a certain topic (water in this context).

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[1] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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In this Study - not only understanding the shared value of water that will be raised, but it will also include the ability to raise their concerns of water matters on societal impacts within their circles of livelihood and outside.

Advocacy - normal definition - the act or process of supporting a cause or proposal, the act or process of advocating something, or the act of pleading or arguing in favour of something, such as a cause, idea, or policy.

In this study - the act of giving mandate or recognition (normally for a course).

Capacity Building- normal definition - Planned development of (or increase in) knowledge, output rate, management, skills, and other capabilities of an organisation through acquisition, incentives, technology, and/or training. Also applied for a governmental organisation.

Public Participatory Platforms- there have been many definitions were derived from previous studies (De Stefano et al., 2012; Beierle, 2002; Hernández-Mora & Ballester, 2011). The public participatory platform is referred to many words which were collaboration, deliberation, involvement, social learning, engagement, and co-management. In the other words, the broad definition of public participatory platforms defined as the involvement process. In this context, the involvement shall include many stakeholders which may be members of the public, institutional decision-makers, or individuals or representatives of groups with a specific interest in how the water sector is managed or capacity to influence the outcome (stakeholders). In this context, "incorporating public participation (...) implies delaying the decision-making process to obtain results that are socially feasible, responding more adequately to the problems of modern society" (Subirats, 1997). As time passed by, the public has more power and influences in decision making as compared to before. Nowadays, people have become more proactive and voice out their thoughts and ideas through many platforms, especially social media networks. Debate or discussions about government policies or enactment are made openly and it can form and influence the public perceptions. The shifted culture that comes along with the development of the technology surely gives an impact on the government including in the development of science and technology policy. Moreover, Pahl-Wostl et al. (2007) argued that "complex issues and integrated management approaches cannot be tackled without taking into account stakeholders' information and perspectives and without their collaboration". As per the current situation with regards to water issues in Malaysia, the government of Malaysia should collaborate with other stakeholders and consider their suggestions and ideas in managing water.

Normally for the community - Community capacity building often refers to strengthening the skills, competencies and abilities of people and communities in developing societies so they can overcome the causes of their exclusion and suffering.

Understanding the spirit of WST2040 which recognised AACB as a GAME CHANGER in the way forward in achieving the objectives, the AACB Sub-Sector shall adopt appropriate processes that are inclusive and that reaches out to most stakeholders by engaging strategic consultations approach that is now commonly known as the public participatory process (PPP). The PPP, dialogues and the likewise will be applied to achieve necessary buy-in and trigger a collaborative action with relevant parties in developing and achieving the desired outputs and outcomes required under this Study (USEPA, 2018; Sale 2006). Therefore, AACB Sub-Sector has adopted the concept 'Let's MAKE THE CHANGES WHICH IS BUSINESS UNUSUAL'.

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2.0 OBJECTIVES OF AACB SUB-SECTORAL STUDY

The objective of this AACB Sub-Sector is to review and recommend products of AACB programmes for nationwide implementation, targeted at all water-related institutional and community stakeholders at Federal, State levels and local levels to grasp the Water Security and Water as an Economic Opportunity. The overall objective is to mainstream water transformation via multi-stakeholders' engagement for sustainable water resources management as the following:

1. To recommend a management plan to government for better enforcement of IWRM policies.
2. To benchmark businesses and industries on current water management practices towards sustainability and to act responsibly in managing their water resources throughout the value chain.
3. To instil a sense of ownership amongst stakeholders towards their rivers and engaging in effective participation towards ensuring sustainable management of their river basin.
4. To incorporate academic knowledge to support a sustainable water resource management.

3.0 SCOPE OF THE AACB SUB-SECTORAL STUDY ACCORDING TO THE TERMS OF REFERENCE AND WITH REFERENCE TO THE RELEVANT STUDY'S FOCI

In this study, the AACB Sub-Sector's scope of the study is:

1. AACB IWRM Sub-Sector will review and analyse current policies with a view of improvement for the meaningful implementation of IWRM towards WST2040. Therefore,

    a. AACB Sub-Sector will study all water/IWRM relevant policies existing in the country to explore whether any of these policies contain specific items or thrust areas on AACB for IWRM.
    b. If yes, AACB Sub-Sector will make it better from time to time (starting in 12th to 15th MP), to fulfil current and future demands and expectations to realise the WST2040 aspirations.
    c. If no, AACB Sub-Sector will suggest an appropriate policy framework on AACB for IWRM.

2. AACB Sub-Sector will also undertake comparative strategy analysis/business models with other nations. Therefore, the AACB Sub-Sector will consider the following comparisons between Malaysia and other nations:

    a. In comparison with the United Kingdom, AACB Sub-Sector examines water awareness campaigns in Malaysia that intend to shape water users' habits and perspectives on water, and to create responsible citizens.
    b. AACB Sub-Sector to examine policies that promote grassroots advocacy intending to create a network of trained water advocates in-country, states and/or districts between Malaysia and the Philippines.
    c. AACB Sub-Sector to undertake a comprehensive review of the literature on capacity building and training for IWRM for WST, with the aspirations of providing suggestions and recommendations for multiple stakeholder groups at the scales of federal governments, state governments, local authorities, individual utilities, and intermediate units of governance while comparing between Malaysia and Mekong River Commission.
    d. Comparison between Malaysia and Finland in terms of water management at the River Basin level (Water is our DNA).

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e. Comparison between Malaysia and Germany in terms of The RhineNet programme (Democracy is giving back to the community).
f. Comparison between Malaysia and Singapore in terms of Active, Beauty, Clean (ABC) programmes.
g. Comparison between Malaysia and South Korea in terms of Saemaul-Undong 'Community Driven Development' village programme.
h. Comparison between Malaysia and Australia in terms of IRBM Governance.

3. AACB Sub-Sector will take into consideration the current global markets towards making the water sector a dynamic new economic sector capable of driving the nation's GDP growth in the future. Therefore, AACB Sub-Sector will focus on the following issues:

   a. AACB Sub-Sector's Public Participatory Platform (PPP) will facilitate as a national platform for awareness-raising, advocacy and capacity building of all relevant stakeholders towards their willingness to participate in water resources management.
   b. AACB Sub-Sector's Training Modules (based on Quadra Helix Model) will enhance the capacity of government, business, academia and community/NGO/CBO sectors towards water resources management.

4. AACB Sub-Sector will prepare a transformation strategy and initiative implementation framework for each of the 4 Phases including the Implementation Agencies, Estimated Budgets and Main Target Achievements Based on the Analysis Undertaken and Expert Reviews with the progress of the study. Hence, AACB Sub-Sector will consider:

   a. Raising awareness and education in IWRM for WST at all levels of relevant Quadruple Helix Model including at community and institutions.

5. AACB Sub-Sector will undertake consultations with stakeholders and experts to finalise the proposed strategies and initiatives of the nation's Water Sector Transformation. Therefore, AACB Sub-Sector considers:

   a. Building capacity within and amongst all collaborating stakeholders of the quadruple helix model is of great importance to enhance sustainability and functionality for an effective WST.
   b. AACB Sub-Sector approach is sharing knowledge and expertise, and experiences where three 'T' are important, i.e. Tactic, Technic, and Technology towards WST2040.

6. AACB Sub-Sector will also prepare a complete Roadmap for the National Agenda on the Water Sector Transformation 2040 for various Ministries' and Agencies' information and guidance for the implementation of programmes and activities towards achieving the targeted Transformation objectives. Therefore:

   a. To propose a roadmap for AACB of IWRM towards WST2040 will enhance the knowledge, capacity, and capability for the integrated management of water resources in the country via implementable mechanisms for mobilising and securing human, financial, and technical resources with an aspiration to become an international AACB Hub of WST.

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AACB and PPPs are important in empowering communities at the grassroots level to ensure good quality drinking water, healthy lands, effective management, and connected communities. AACB and PPPs for IWRM will lead to a good protection of water resources via good initiatives that would include keeping rivers, lakes, groundwater, and other water bodies clean for environmental and human health.

4.0 SUB-SECTORAL STUDY PROCESS AND IMPACTS, IF ANY, FROM COVID-19 PANDEMIC

As the world is struggling with the pandemic Covid-19 since December 2019, there had been several challenges in implementing the AACB Sub-Sector activities. Apart from the movement control order, the government also had encouraged all population to embrace the new norms, whereby the public will also play their respective roles as frontlines to curb the spread of Covid-19. There are now guidelines that need to be obeyed under the Prevention and Control of Infectious Diseases Act 1988 (Act 342). There are restrictions in terms of mass gatherings, physical distancing and movement between districts and states, and in certain hot spot areas which must be considered in this study. The strategies and initiatives to manage the implementation of awareness-raising, advocacy and capacity building programmes during Covid-19 pandemic and its recovery periods will have to conform to the rules, regulations, and guidelines. The Covid-19 pandemic has indeed affected modalities of delivery of materials of training and capacity development activities around the world (UNESCO, 2020). Some critical components of awareness-raising, advocacy and capacity-development activities would include the need to identify the appropriate ways of combining the instruction and discussions via online platforms, face to face interaction, hands-on experiences sharing, etc.

Due to movement control order, AACB Sub-Sector faced several constraints in the study process. Initially, the AACB Sub-Sector has planned to visit existing training centres that cover both peninsular and Sabah and Sarawak. However, the Covid-19 situation has not permitted these activities and limit AACB Sub-Sector to do so. AACB Sub-Sector managed to visit 22 existing training centres in peninsular. Thus, to overcome the limitation, AACB Sub-Sector has taken initiative by conducting desktop studies to identify suitable training centres. AACB Sub-Sector also has a limitation on conducting the pilot study planned in Petagas River, Sabah, Muda River basin, Kedah and Baram River Basin, Sarawak. AACB Sub-Sector managed to conduct one pilot study online with Sungai Muda stakeholder using community module.

5.0 REPORT ON FINDINGS BASED ON EACH SCOPE OF THE AACB SUB-SECTORAL STUDY AS REQUIRED BY THE TERMS OF REFERENCE (TOR)

5.1. TOR Scope 1 (Review and Analyse Current Policies with a view to Improvement)

5.1.1 Review National Policies

AACB Sub-Sector has analysed 26 National policies and action plan with regards to Advocacy, Awareness Raising, Capacity Building and Public Participatory Platforms as listed:

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Table 5.1: List of National Policies reviewed by AACB Sub-Sector

No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
1	National Resources Water Policy 2012					Enhancing the sense of ownership. It is suggested that new policy to address this issue by ensuring new development to include the name of the river and the river basin in their advertisement. Instead of just highlighting that new home owners will enjoy the lake view or the river view, they can include the fact that "new owners will enjoy living near a scenic Sungai Lui, a sub-basin of Langat River." Such requirement can be imposed by the local government when granting planning permission to the developer under section 21A (1A) of the Town and Country Planning Act 1972. At the moment, the law only requires the developer to include an analysis of the social implications of the development. As a matter of fact, the development will have a direct and indirect impact on the river or the river basin. It is thus natural for the public to understand the rivers and the river basin where they are going to live in and appreciate the nature and status of the river nearby. There are many IWRM experts and talents in Malaysia from academia, government, NGOs, and the community. They are very useful and important assets in ensuring the acceleration of the implementation of IWRM in Malaysia. Some of them get specialised education in core streams at the university. Meanwhile, some of them are mobilisers and practitioners in their residential areas, and some of them become an expert because of training and experience from their careers. They are agents of knowledge transfer to the community and very valuable advocator in the community. This expert needs to be identified to assist as an advocate for the implementation of IWRM. Robust AACB and tailor made must be established to accelerate the IWRM understanding at all levels Institutionalisation of public participatory platform (PPP) for the effective decision-making processes of IWRM. Empowering people and developing capacity building via the Quadruple Helix (Government, Business & Industry, Academia, Community) with IWRM and IRBM knowledge using several communication strategies. Capacity building and continuous improvement of stakeholders can be strengthened via enhancing communication skills, river care knowledge, environmental subjects. Soft skills training on public outreach will enhance the awareness and capacity of all stakeholders. Moreover, enhancing the River basin understanding of the government officials will be effective via developing awareness that is in line with	NRE	KASA

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
						IWRM, IRBM, ICZM, etc. Enhancing and promoting river address, developing a simple brochure, video, etc. will also enhance the awareness of the civil servants on IWRM. One of the game changers or tipping points for AACB Sub-Sector in making the WST a reality and to be matched by political will via the involvement of parliamentarians of Malaysia via their All-Party Parliamentary Group Malaysia (APPGM).		
2	National Integrated Water Resources Management Strategic Plan					AACB training module to enhance stakeholders' leadership roles and facilitate enforcement of policies and laws for better water governance. AACB training module aspires to enhance stakeholders' leadership roles to facilitate the enforcement of policies and laws for better water governance including to minimise future disaster from man-made and natural sources.	NRE	MOSTI
3.	National Policy on the Environment 2002					• KASA to expedite the enactment of DAN that promote the IWRM. • Strengthening AACB & PPPs in Malaysia via AACB WST2040 programmes based on the quadruple helix model, i.e. comprising the main four clusters of stakeholders namely the Community & NGO; Business & Industry; Government; and Academia. It is suggested that relevant agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform. • To activate and empower the existing environmental volunteers and community-driven programmes e.g.: Rakan Alam Sekitar, Friends of River and updated them with info/status on IWRM in their community. Community-driven programmes in environmental conservation need to be increased to empower people to protect and conserve water resources as well as create socioeconomic activities. Various successful initiatives including the Tagal system and FoR programmes will also be expanded. Campaigns to inculcate water-saving habits and precise water use amongst domestic users and farmers will be intensified through community platforms such as Kumpulan Pengguna Air.	KeTTHa	KASA
4	Solid Waste Management Policy (2016)					To incorporate the solid waste management practices into AACB modules and programmes. • AACB training module to enhance stakeholders' leadership roles and facilitate enforcement of policies and laws for better water governance. AACB training module aspires to enhance stakeholders' leadership roles to facilitate the enforcement of policies and laws for better water governance including to minimise future disaster from man-made and natural sources.	-	KPKT

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
5	National Policy on Climate Change, 2009					Empower the Government role in Climate Change through: The IWRM AACB WST2040 Training Module for government officials is designed from the perspectives of disaster risk reduction (DRR) considering both natural and man-made water-related disasters. The DRR perspective has been included in the training module to prepare the government officials for the worst situation to tackle water-related disasters so that they can act promptly to reduce the frequency and intensity of future disasters. Empower the Academia role in Climate Change through: Develop teacher's professional development workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation. Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teacher's professional development. Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP). Incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers. Develop a water and climate literacies assessment instrument. Empower the Business & Industry role in Climate Change through: Providing a holistic 'Training of Trainers' capacity building programme for the stakeholders of the Business & Industry cluster whereby the capacity building module will include awareness-raising on demand management and how business and industry could play a role in addressing risks and environmental consequences of their operations and improving water efficiency and sustainability. Empower the community role in Climate Change through: Through the WST2040 AACB community module, it is hoped that the enabling environment can be created to accelerate the community's participation and water stewardship expansion in the country. Strategic partnerships between the NGOs and the community will be organised to tackle issues faced by them effectively, to increase the community's awareness and to instil a sense of ownership towards their rivers.	-	KeTSA

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
6	National Policy on Science, Technology and Innovation 2013-2020					• Enhance PPPs and AACB Through Digital Learning Spaces. It is recommended for Malaysia to leverage the pervasiveness of technologies to serve the greater cause of water resource management. To adopt suitably advanced medium technology to spread awareness to the IWRM stakeholders. Inclusivity in data sharing. Data is an important component for decision making. In Europe, the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters, famously known as the Aarhus Convention, requires greater access to data for the public to make good decisions in environmental matters. There is no such provision in the ASEAN region, let alone in Malaysia. Compared to the websites of agencies in Europe, America and Australia, there are relatively lack of data on the website of agencies in Malaysia, and there are data which will be released upon certain payment. Thus, concerted efforts are needed for the government agencies to make data readily available on their website to ensure the public can make good judgement for their community. It is recommended that the Official Secret Act to be amended to exclude information relevant for environmental decision making. In the case of Malayan Trade Unions Congress (MTUC) & Ors v Minister of Energy, Water and Communications & Government of Malaysia (Civil Appeal No: 01(f)-6-03/2013(W) the MTUC pursued against the Government for access to an audit report and the concessionaire agreement with Syarikat Bekalan Air Selangor Sdn Bhd (SYABAS). The court satisfied that the MTUC had a genuine interest in the document but denied access to both documents on the ground of official secret document. The decision relaxed the law on locus standi by allowing anyone who has genuine interest in clean environment to bring an action in the court but denied access to data and official documents relevant to environmental matters.	-	MOSTI
7	National Cleanliness Policy 2019					Empowering people and developing capacity building via the Quadruple Helix (Government, Business & Industry, Academia, Community) with IWRM and IRBM knowledge using several communication strategies. Capacity building and continuous improvement of stakeholders can be strengthened via enhancing communication skills, river care knowledge, environmental subjects. Soft skills training on public outreach will enhance the awareness and capacity of all stakeholders. Moreover, enhancing the river basin understanding of the government officials will be effective via developing awareness that is in line with IWRM, IRBM, ICZM, etc. Enhancing and promoting river address, developing a simple brochure, video, etc. will also enhance the public awareness on IWRM.	-	KPKT

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
8	National Policy on Biological Diversity 2016-2025					• Government officials become more functional – following every measure of programmes, must have Communication Environment Public Awareness (CEPA), and working for info centre, gallery on big projects, such as that collaboration with the tourism department, whereby people can have information on the projects, and also local business which have a bit of economy gain for the locals.	KeTSA	NRE
9	Green Technology Master plan Malaysia 2013-2030					• Incentives and award should be provided for the green watershed restoration and nature-based solutions. It is recommended for Malaysian Investment Development Authority (MIDA) to introduce a new category in Green Incentives that is related to water management project. This recommendation aims to encourage more stakeholders to adopt and implement water management project in their premises and operations, for example, water reuse and reclamation for non-portable purposes. Any investments in this area to enable business and industry to adopt these practices should be given tax incentives. Besides, Ministry of Finance (MOF) and Inland Revenue Board of Malaysia (LHDN) should also give tax incentives to business and industry that managed to protect and upgrade the condition of the nearest water body for instance the company's tax exemption will be given to business and industry entities, especially to companies for their involvement and contribution in conserving water resources. • Green incentives and certification for AACB WST Training attendees. Green incentives and certification, and recognition should be given to the SMEs for attending the AACB WST Training programme before water servicing licensing and relicensing.	KETTHA	NRE
10	National Agrofood Policy 2011-2020					• Embedded the IWRM principles in Agriculture practices through AACB programmes- In the agricultural sector, farmers' involvement in water resource management needs to be enhanced through their participation in the operation and maintenance of irrigation infrastructure. The implementation of AACB programmes will help in decision-making for development, particularly in land use change. **Remarks: The National Agrofood Policy 2021-2030 is currently being drafted.**	MOA	MAFI
11	National Environmental Health Action Plan (NEHAP) Malaysia					• Comprehensive and tailor made AACB programme must be established.	-	MOH
12	National Urbanisation Policy 2 (2016-2025)					• Role of local government serves as an important mechanism to further enforce the policies and to facilitate the implementation of relevant strategies and	-	KPKT

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
						programmes of the federal and state governments especially on Disaster Risk Reduction (DRR). Incorporate IWRM in the local plan, hence future development will minimise the impact on the river basin.		
13	National Policy on Rural Development (2030)					Enhancing the sense of ownership. As people are relying on water supply from the tap, then forget that the water comes from the river. They may or may not even know the name of the river nearby and the bigger river basin where they live. It is suggested that a new policy to address this issue by ensuring new development to include the name of the river and the river basin in their advertisement. Instead of just highlighting that new homeowners will enjoy the lake view or the river view, they can include the fact that "new owners will enjoy living near a scenic Sungai Lui, a sub-basin of Langat River." Such requirements can be imposed by the local government when granting planning permission to the developer under section 21A (1A) of the Town and Country Planning Act 1972. At the moment, the law only requires the developer to include an analysis of the social implications of the development. As a matter of fact, the development will have a direct and indirect impact on the river or the river basin. It is thus natural for the public to understand the rivers and the river basin where they are going to live in and appreciate the nature and status of the river nearby.	-	MRRD
14	Shared Prosperity Vision 2030					• Ensure balanced fiscal federalism, and carrot-and-stick approach to local government. Continuous Federal funding is also very vital for the rehabilitation and restoration of river basin management. AACB training programme will enhance the leadership roles of stakeholders for rehabilitation and restoration of river basin management. Federal funding is the main strength to adopt the green economic approaches for IWRM in Malaysia. Therefore, adequate green funding along with training will encourage stakeholders for sustainable water resources management while applying green economic approaches such as 'payment for ecosystem services', application of 'polluter pays' principle, and uniform pricing model for water resources, and as such. Moreover, water-based recreation and tourism activities via AACB training programme will also encourage local authorities to promote local level income generation while incorporating the local communities.	PMO (EPU)	PMO (EPU)
15	National Community Policy					Establish IWRM information centre such as Pusat Informasi Sungai at community or Information corner at religious institutions such as surau and churches, local authority offices, tourist info centres, schools and universities.	-	KPKT

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
						Strengthening AACB and PPPs in Malaysia via AACB WST2040 programmes based on the quadruple helix model, i.e., comprising the main four clusters of stakeholders namely the Community & NGO; Business & Industry; Government; and Academia. It is suggested that relevant agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform.		
16	National Energy Efficiency Action Plan, 2015					To incorporate the AACB IWRM programme into current and future National Energy Efficiency Action Plan's programme and initiatives.	KeTTHa	NRE
17	National Forestry Policy (1978; Revised 1992)					Continuous RDIC for National Integrated Data Bank. Continuous RDIC (i.e., research, development, commercialisation and innovation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDIC will effectively facilitate the real time decision making of stakeholders especially at local level to promote decision-making processes quickly. In this regard, the stakeholders' mapping, series of dialogue and consultations amongst the federal, state and local level stakeholders will also justify the use of real time data and information coming from RDIC for IWRM. To mainstream water resource management as one of the priority research areas in RDIC. It will enhance the roles of researchers and academia from higher education institutions (HEIs) in promoting sustainable water resources management.	NRE	NRE
18	National Transport Policy 2019-2030					To incorporate the AACB IWRM programme into current and future National Transport policy programme and initiatives.	-	MOT
19	Shared Prosperity Vision 2030					• Establish IWRM information centre such as Pusat Informasi Sungai at community or Information corner at religious institutions such as surau and churches, local authority offices, tourist info centres, schools and universities.	Ministry of Economic Affairs	Ministry of Economic Affairs
20	National Consumer Policy (2002)					• Strengthening AACB and PPPs in Malaysia via AACB WST2040 programmes based on the quadruple helix model, i.e., comprising the main four clusters of stakeholders namely the Community & NGO; Business & Industry; Government; and Academia. It is suggested that relevant agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings, and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform.	-	KPDNKK

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
						• Establish Communication strategy in advocating and educating the consumers on water related matter such as water tariff mechanism, save water education programme, save river programme, etc. • Empower the public participatory platform through Forum Air – established under Section 70 under WSIA act, this body is doing exactly what AACB is doing, an arm under SPAN, especially in water tariff. • Denai Sungai Kebangsaan as one of the public participatory platforms – as of this year, have established more than 200km of trails, focussing more in Selangor, Johor, Kelantan, Negeri Sembilan; an approach to make people more close to water source, all in the form of publication were compiled, parts for the DSK also can be extracted and put into AACB module. The target for next 5 years is to have 5,000km of trails (end of 12MP).		
21	Education Blueprint (2006-2010)					• Reiterate importance of rivers as water resources for human and the environment at school. The topics related to water have been incorporated into school curriculum, this includes the syllabus of preschools, primary and secondary schools. This means that the topics which related to water have already been part of the formal education. However, it is possible that students might have forgotten or still not aware that water comes from the rivers. In this regard, teachers should be trained and retrained, where they should learn more case studies related to river management, thus they can share these case studies with students when teaching water related topics in the syllabus. A strong TVET ecosystem will be a game changer that will create future-ready talent in meeting the industry demand. In this regard, there is a need to incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers. • Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management. Researchers at HEIs have vast experience in research, training and consultation, hence they should share their expertise with stakeholders, namely government, industry and community. For government, researchers can provide technical inputs as subject matter experts (SMEs) to government officers, as well as to represent Malaysia or assist government officials in international and regional negotiations. Besides, researchers also can become the memory keeper for the relevant ministry/ agency to ensure sustainable knowledge transfer. For industry, researchers can work closely with professional	-	KPM

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
						bodies to provide professional training courses or become consultants/technical advisors to selected industries. As far as the community is concerned, researchers can take the leadership and proactive measures to outreach to the communities. Besides, researchers can also promote the concept of citizen science to enhance the community's engagement in sustainable water resources management. • Continuous RDIC for National Integrated Data Bank. Continuous RDIC (i.e. research, development, commercialisation and innovation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDIC will effectively facilitate the real time decision making of stakeholders especially at the local level to promote decision-making processes quickly. In this regard, the stakeholders' mapping, series of dialogue and consultations amongst the federal, state and local level stakeholders will also justify the use of real time data and information coming from RDIC for IWRM. • To mainstream water resource management as one of the priority research areas in RDIC. It will enhance the roles of researchers and academia from higher education institutions (HEIs) in promoting a sustainable water resources management.		
22	National Physical Plan 3 (2016)					• Appropriate tools that can be used by government officers and local community to monitor the river's water quality. Local government should be given the appropriate tools/applications/software to measure/ monitor the quality and quantity of the waters under their jurisdiction. The locals also should be the first person to report water issues. • AACB training module to enhance stakeholders' leadership roles and facilitate enforcement of policies and laws for better water governance. AACB training module aspires to enhance stakeholders' leadership roles to facilitate the enforcement of policies and laws for better water governance including to minimise future disaster from man-made and natural sources. • Role of local government serves as an important mechanism to further the policies and to facilitate the implementation of relevant strategies and programmes of the federal and state governments especially on Disaster Risk Reduction (DRR). Incorporate IWRM in the local plan, hence future development will minimise the impact on the river basin. • Enhance leadership of government officers especially at local and district levels in moving and realising the IWRM via quadruple helix mode via practices and activities supported by a good flow of scientific data and information.	-	KPKT

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No.	Related Policies/ Strategic Plan Reviewed	A	A	CB	PPPs	Area for Improvement	Previous Ministry	Current Ministry
23	Malaysia Smart City Framework (2018)					• Role of local government serves as an important mechanism to further enforce the policies and to facilitate the implementation of relevant strategies and programmes of the federal and state governments especially on Disaster Risk Reduction (DRR). Incorporate IWRM in the local plan, hence future development will minimise the impact on the river basin. • Appropriate tools that can be used by government officers and local community to monitor the river's water quality. Local government should be given the appropriate tools/applications/software to measure/ monitor the quality and quantity of the waters under their jurisdiction. The locals also should be the first person to report water issues.	-	KPKT
24	Environmental Sustainability 2020-2030					• Strategic alliances with renowned regional and international water research and training centres. The National Research and Capacity Building institutes to enter into strategic alliances with renowned regional and international water research and training centres. Regular participation in reputed water-related international water fora by the civil servants will enhance their leadership skills and capacity in water management. • Collaboration with government agencies and relevant stakeholders. Partnerships between agencies and joint programmes between government sectors as well as collaboration and smart partnership help build linkage to enhance knowledge and help foster connectivity between agencies to develop a common sense of ownership.	-	KASA
25	Ministry of Water, Land and Natural Resources Strategic Plan 2019–2023					Even though water portfolio has been change to KASA, IWRM related AACB programme must be continuous. The AACB training module to enhance stakeholders' leadership roles and facilitate enforcement of policies and laws for better water governance. AACB training module aspires to enhance stakeholders' leadership roles to facilitate the enforcement of policies and laws for better water governance including to minimise future disaster from man-made and natural sources.	KATS	NRE
26	Malaysia Roadmap Towards Zero Single Use Plastics (2018-2030)					To incorporate the AACB IWRM programme into current and future Zero single use plastics programme.	KPKT	KPKT

Indicator:

Present

Not present

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1. National Resources Water Policy (2012)

The main policy of water resources in Malaysia is The National Water Resources Policy (NWRP) which was officially approved by the Malaysian Cabinet on 22 February 2012. The NWRP was initiated from the 10th MP which asserted that there was a necessity to formulate a NWRP that will serve as a thorough guide to assist water and water resources governance in the country.

There are five objectives of the NWRP, summarised as the following:

1. To establish water security and sustainability through integrated and collaborative mechanisms involving all stakeholders,
2. To provide ways to complement current policy directions related to water resources sustainability and fair use, as well as to protect environmental integrity, ecosystems and natural heritage;
3. To provide a platform to strengthen water resources intelligence as well as uniform practices through the streamlining of standards, measures, methods, and approaches;
4. To set out the means and measures for the adoption of water resources conservation plans at multiple scales to complement and strengthen existing land, resources, physical and other related development plans; and
5. To enhance stakeholders' capacity for effective participation and collaboration in water resources governance at multiple scales and levels focussing on developing human resources, science, technology and practices as well as encouraging investment in research, development and innovation.

The core areas for the policy in the NWRP are:

1. Policy Directions for Core Area 1: Water Resources Security
2. Policy Directions for Core Area 2: Water Resources Sustainability
3. Policy Directions for Core Area 3: Partnership
4. Policy Directions for Core Area 4: Capacity Building and Awareness

There are specifically two core areas related to AACB and PPPs:

Key Core Area 3: Partnership

Thrust 7: Stakeholder Inclusiveness and Engagement
Target 1: Mechanisms for formal and informal consultation on matters related to water resources.

Thrust 8: Shared Water Resource Governance
Target 2: Stakeholder collaboration in water resources governance.

Key Core Area 4: Capacity Building and Awareness

Thrust 9: Capacity Building
Target 1: Build capacity of key water resources stakeholders.

2. National Policy on the Environment (2002)

National Policy on the Environment (DASN) has been established for continuous economic, social and cultural progress and enhancement of the quality of life of Malaysians through environmentally sound and sustainable development.

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The objectives of DASN are to achieve the following:

i. A clean environment, safe, healthy and productive environment for present and future generations;
ii. Conservation of country's unique and diverse cultural and natural heritage with effective participation by all sectors of society; and
iii. Sustainable lifestyles and patterns of consumption and production.

DASN highlights (8) principles to harmonise economic development goals with environmental imperatives:

1. Stewardship of the Environment
2. Conservation of Nature's Vitality and Diversity
3. Continuous Improvement in the Quality of the Environment
4. Sustainable Use of Natural Resources
5. Integrated Decision-Making
6. Role of the Private Sector
7. Commitment and Accountability
8. Active Participation in the International Community

Under DASN, Malaysia's Green Strategies will be directed towards the following key areas:

a. Education and Awareness
b. Effective management of natural resources and the environment
c. Integrated development planning and implementation
d. Prevention and control of pollution and environmental degradation
e. Strengthening administrative and institutional mechanisms
f. Proactive approach to regional and global environmental issues
g. Formulation and implementation of Action Plans.

There are specifically two key areas related to AACB and PPPs:

Key Area 1. Education and Awareness

1.1 Comprehensive formal and informal environmental strategies and education and training strategies and information dissemination programmes will be devised and introduced.

1.2 Environment and development will be integrated into educational activities, from school to tertiary institutions. Towards this end relevant methods and materials will be developed for environmental education programmes.

1.3 National centres of excellence will be established for interdisciplinary research and education in environment and development, towards a view to strengthening national capacity in related fields.

1.4 Education curricula at all levels will be reviewed to ensure a multidisciplinary approach with environment and development issues.

1.5 Non-formal education activities will be promoted at local and national levels. These activities will include the direct involvement of social support groups and recognise the important role of the family unit in inculcating positive environmental attitudes.

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1.6 Public information services on environment and development will be made available and these may include information technology, multi-media and other audio-visual methods. Public and academic forums to discuss environmental and development issues will be encouraged.

1.7 Activities in the arts and cultures circles which contain a positive message with regard to the environment and development will be promoted.

1.8 The role of the media in disseminating environmental information will be strengthened. In particular, environmental journalism and associations will be accorded recognition, with a view to raising the quality of environmental reporting.

1.9 Cooperative relationships with the media, entertainment and advertising industries will be promoted to mobilise their experience in shaping public's behaviour and consumption patterns.

1.10 Environment and development issues will be integrated into the activities of groups including professional associations, trade unions and employers' organisations. Dissemination of information and training will be extended to include decision-makers, employees, and employers.

1.11 Manpower training programmes will be designed to enable trainees to deal with environment and development problems.

Key Area 5. Strengthening Administrative and Institutional Mechanisms

5.7 Cooperation between government agencies, whether federal-state or intersectoral, non-governmental organisations, the media, the private sector, professional bodies and public shall be promoted for the implementation of the environmental standards, dissemination of information and the inculcation of environmentally responsible attitudes throughout society.

5.8 The environmental management capacity of all sectors shall be strengthened and enhanced by encouraging and supporting the establishment of centres of excellence in research and development in ecological and environmental sciences, environmental technology, training and policy analysis.

3. National Policy on Climate Change (2009)

The Policy Statement calls for "Ensuring climate-resilient development to fulfil national aspirations for sustainability". In the context of the Policy, "Development that integrates response measures on climate change and extreme weather (physical manifestations) in line with national priorities (socioeconomic and international obligations).

The Objectives are:

i. Mainstreaming of measures to address climate change challenges through strengthened economic competitiveness, wise management of resources, environmental conservation and enhanced quality of life for sustainable development;
ii. Integration of responses into national policies, plans and programmes to strengthen the resilience of development from arising and potential impacts of climate change; and

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iii. Strengthening of institutional and implementation capacity to better harness opportunities in reducing negative impacts of climate change.

There are specifically two key areas related to AACB and PPPs:

The policy recognises the adverse effects and impacts of climate change and undertakes to mainstream national responses that consolidate economic, social and environmental development goals based on the following principles:

P1: Development on a Sustainable Path - Integrate climate change responses into national development plans to fulfil the country's aspiration for a sustainable development.
P2: Conservation of Environment and Natural Resources - Strengthen implementation of climate change actions that contribute to environmental conservation and sustainable use of natural resources.
P3: Coordinated Implementation - Incorporate climate change considerations into implementation of development programmes at all levels.
P4: Effective Participation - Improve participation of stakeholders and major groups for effective implementation of climate change responses.
P5: Common but Differentiated Responsibilities and Respective Capabilities - International involvement on climate change will be based on the principle of common but differentiated responsibilities and respective capabilities.

There are several key actions and strategies related to AACB and PPPs. In term of awareness, some key areas highlighted as below:

KA19 - ST5: Promote RE and EE for power generation through:
- Promotion of RE generation by small and independent developers including local communities.
KA20 - ST5: Promote RE and EE to reduce GHG emissions in the transportation sector through:
- Promotion of water transportation.
KA22 - ST5: Promote construction of green buildings in commercial /institutional, industrial and residential sector.
KA36 - ST8: Promote community-based climate change responses and programmes.
KA39 - ST9: Promote sustainable lifestyles and explore incentives that encourage them.
KA43 - ST10: Promote regional cooperation on climate change within existing inter-governmental and non-governmental mechanisms.

In terms of advocacy:

KA35 - ST8: Strengthen legislative provisions for participatory planning and decision making.

In terms of capacity building:

KA23 - ST5: Empower local communities in basic RE maintenance, especially in rural electrification including mini and micro hydroelectric schemes.
KA30 - ST7: Institutionalise the following stage-based climate- friendly technology transfer programme to nurture self-innovativeness and R&D sustainability in local firms and institutions.
KA41 - ST10: Institutionalise a mechanism for coordinating consultation amongst stakeholders on national positions and responses to address current and emerging issues for international negotiations.
KA42 - ST10: Institute continuous capacity building programmes to support negotiation and implementation of international obligations.

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In terms of public participatory platform:

P3: Effective Participation Improve participation of stakeholders and major groups for effective implementation of climate change responses.

ST8-P4: Improve collaboration through efficient communication and coordination amongst all stakeholders for effective implementation of climate change responses.

KA14 - ST4: Develop and implement plans for public-private, NGOs and community's collaboration on climate change.

4. National Agro-Food Policy (2011-2020)

*National Agrofood Policy 2021-2030 is currently being drafted

Malaysia launched National Agro-Food Policy (2011-2020) in 2010. The objectives of the policy are to ensure adequate food supply and food safety, to develop the agrofood industry into a competitive and sustainable industry and to increase the income level of agricultural entrepreneurs.

The policy only emphasised in ensuring the water supply and demand is sufficient and clean, technology and infrastructure on water supply and drainage were properly improved and maintained to ensure the food security. (Focussed on sufficient quantity and high quality of water to be supplied to agriculture sector). The policy lack in emphasising and highlighted the value and risk of water management. No awareness, advocacy and capacity building mechanism and tools of water management was embedded in some of the policy. The role of water in development is not recognised fully in this policy. Currently, National Agrofood Policy 2021-2030 is currently being drafted.

5. National Forestry Policy (1978; Revised 1992)

National Forest Policy in 1977 was approved by National Forestry Council and has been certified by the National Land Council in 1978. Later the policy was amended in November 1992. The amendment was performed to address issues raised by the international community on the importance of biodiversity conservation and utilisation of genetic resources and the role of local communities on the development of genetic resources and the role of local communities on forest development. The implication of this policy has improved the relationship and cooperation between the Federal and State governments in the development of the forestry sector. The core important aspect highlighted in the policy are:

1. Declaration of forest as Permanent Forest Reserve (*Hutan Simpan Kekal*) for sufficient areas and strategically located throughout the country, based on the concept of rational land use. *Hutan Simpan Kekal* are classified under four main functions will be handled as:
    a. PROTECTION FORESTS to ensure the stability of the country's climatic and physical conditions, the control of water resources, soil fertility, environmental quality, biodiversity conservation and reduce flood damage and erosion to rivers and agricultural land.
    b. WORK FORESTS for the continued supply of forest products, at reasonable rates in the economy of the country to the needs of agriculture, domestic, industrial and export.
    c. AMENITY FORESTS to maintain a sufficient area as a recreational, eco-tourism and to increase public awareness about the forest.

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d. RESEARCH AND EDUCATION FORESTS for research, education and preservation of biological diversity.

1. Managing *Hutan Simpan Kekal* in order to maximise the benefits of social, economic and environmental in the national interest in line with the principles of sustainable management.
2. To implement a planned programme of forest development through the forest conservation and preservation operational practices based on appropriate silviculture.
3. Promoting efficient harvesting and the use of work forests for the maximum economic benefits for all types of forest products and encourage the forest industrial development in line with the trend of forest resources and employment opportunities.
4. Promoting the planned forest industrial development towards the production of finished goods and semi-finished products with value-added for local consumption and export.
5. Aggressively encourage the participation of natives in wood-based industries in line with government policy.
6. Establish forest plantations of local species and abroad to meet the wood supply from natural forests.
7. Increase the involvement of local communities to actively participate in various forestry development projects and maintaining their involvement in forest farming programmes.
8. Increasing non-timber forest products through the practices of scientific management and sustainable to meet local demand and needs of related industries.
9. Implementing a comprehensive programme of forestry training at all levels of public and private sectors to ensure adequate number of trained manpower to meet the needs of forestry and wood-based industries.
10. Encourage private investment in forest development through the establishment of private forest plantation area.
11. Managing and supporting programmes of intensive research in the field of forestry and forest products to improve forest benefits to the maximum.
12. To promote education in forestry and handle publicity services and development to enhance the understanding of the range of forest benefits.
13. The protection of biodiversity and the species preservation of unique flora and fauna.
14. Develop a community forestry programme to meet the needs of society both nationally and internationally.
15. Reserve specific areas for forestry education and other scientific studies.
16. Forging closer international cooperation in forestry for the benefit through technology transfer and exchange of scientific information.

6. National Cleanliness Policy (2019)

Minister of Housing and Local Government announced the formulation of the National Cleanliness Policy on 21 February 2019. The policy is a government initiative to make Malaysia a clean country and to create a society that adopts the practice of cleanliness in order to guarantee the well-being of the people and sustainability of the environment. Cleanliness is one of the vital aspects to achieve developed nation status. The implementation of the National Cleanliness Policy will focus on five (5) clusters. A total of 14 strategies and 91 action plans have been outlined to achieve the objectives stated in the National Cleanliness Policy.

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The clusters are:

1. Awareness of Cleanliness
2. Environmental Sustainability
3. Circular Economy
4. Governance and Enforcement
5. Quality and Skilled Human Capital

There are several key actions and strategies are related to AACB and PPPs as highlighted as below:

Cluster 1: Awareness of Cleanliness

Strategy 1.1: Enhance the Culture of Cleanliness

1.1.1 Enhance knowledge, attitudes, and practices in maintaining good health.
1.1.2 Enhance awareness and adoption of cleanliness of oneself, family, community and environment.
1.1.3 Adopt the practice of proper waste disposal through the Throw Rubbish in Rubbish Bins Campaign.
1.1.4 Enhance awareness and societal responsibility in maintaining the cleanliness of toilets.
1.1.5 Enhance responsibility for cleanliness amongst food hawkers, sellers and entrepreneurs.
1.1.6 Encourage society to reduce the use of plastic bags.
1.1.7 Enhance awareness of society's responsibility in managing oil and grease residue at home and on food premises.
1.1.8 Encourage community involvement in the Zero Waste Community initiative.
1.1.9 Appoint ambassadors of cleanliness at educational institutions and communities.
1.1.10 Enhance cooperation between government agencies and NGOs in joint community programmes.
1.1.11 Reinforce cleanliness activities in creating clean communities.
1.1.12 Enhance societal awareness in maintaining cleanliness to prevent infectious diseases.
1.1.13 Educate and discipline society to pick up rubbish so as to create a clean environment.

Strategy 1.2: Promote the Practice of Cleanliness at Home, Workplace, Educational Institutions and Public Areas

1.2.1 Cultivate the attitude of maintaining cleanliness of oneself and at home.
1.2.2 Reinforce educational modules and curriculum related to the adoption of cleanliness, 3R practices and maintenance of the environment.
1.2.3 Promote cleanliness awareness programmes and 3R practices in educational institutions.
1.2.4 Instil the culture of maintaining cleanliness in creating office spaces and workplace surroundings that are clean and conducive.
1.2.5 Enhance the sense of responsibility amongst the people to maintain cleanliness in public areas.
1.2.6 Intensify promotions and announcements through various media on a continuous basis.
1.2.7 Enhance the effectiveness of campaigns and awareness programmes concerning cleanliness.
1.2.8 Make community service as the punishment for individuals who pollute the environment.

Strategy 1.3: Increase Collaboration between Government, NGOs, and Private Agencies

1.3.1 Create a platform for cooperation between government, NGOs, and the private agencies by involving the public in order to reinforce cleanliness programmes and campaigns.

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1.3.2 Enhance Corporate Social Responsibility (CSR) in cleanliness activities in the surroundings by the private sector.

Cluster 2: Environment Sustainability

Strategy 2.1: Optimise Cleanliness Quality

2.1.1 Take strict action against individuals or institutions that commit violations and cause pollution.
2.1.2 Enhance the quality of solid waste collection and public cleansing services throughout the country.
2.1.3 Ensure that public toilets are clean, conducive and well maintained.
2.1.4 Encourage studies, research and innovation in order to enhance productivity, quality and efficiency in the management of solid waste.
2.1.5 Regulate and monitor oil and grease residue management at food premises, including commercial premises.
2.1.6 Ensure that drains, ditches and drainage are not clogged and are maintained properly.

Strategy 2.2: Create Clean and Comfortable Surroundings

2.2.1 Make cleanliness one of the assessment criteria for the star rating system by local authorities.
2.2.2 Establish recognition for Clean Cities.
2.2.3 Plan and develop facilities as well as solid waste treatment that are efficient, integrated and in line with technological advances.
2.2.4 Provide facilities for the management of solid waste according to the type of residence or building.
2.2.5 Ensure that the surroundings in residential, industrial, commercial and institutional areas, construction sites and public places are clean, beautiful and well maintained.
2.2.6 Ensure that national development is balanced by surroundings that are clean, beautiful, green and well managed.
2.2.7 Maintain and preserve natural resources and identifiable landscapes and utilise environmentally friendly technology.

Strategy 2.3: Improve Solid Waste Management Mechanisms

2.3.1 Encourage industrial, commercial and institutional organisations to formulate workplace cleanliness regulations at the organisational level.
2.3.2 Reinforce the implementation of waste separation in residential, industrial, commercial and institutional areas and introduce the 3-Bin Campaign.
2.3.3 Establish terms and conditions for compliance with construction waste management that are more comprehensive.
2.3.4 Ensure that the requirement for infrastructure for solid waste management is taken into consideration in the development of construction projects.
2.3.5 Enhance cooperation between government agencies and NGOs to reduce food waste generation.
2.3.6 Improve the management and procedures for the importation of plastic waste.
2.3.7 Reinforce the monitoring and enforcement of the importation of various types of solid waste such as plastic waste, etc.

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Cluster 3: Circular Economy

Strategy 3.1: Promote Practices of 3R (Reduce, Reuse, Recycle) and Waste Separation

3.1.1 Encourage the development of recycling facilities close to residential, industrial, commercial and institutional areas

Strategy 3.2: Generate Income from Waste (Waste to Money)

3.2.1 Encourage the manufacture of products using recycled waste as raw material.
3.2.2 Encourage the manufacture of products from recycled material (upcycling).
3.2.3 Encourage the recycling of construction waste in the implementation of construction projects.
3.2.4 Encourage the practice of recycling through the method of providing rewards or incentives.
3.2.5 Encourage the use of the latest technology in processing or treating organic waste such as the Anaerobic Digester (AD).
3.2.6 Encourage the use of recycled goods in government procurement projects.

Strategy 3.3: Encourage Industry Players to Adopt

3.3.1 Create industrial cooperation amongst industry players through the concept of circular economy.
3.3.2 Provide incentives to industry players in implementing a circular economy.
3.3.3 Formulate food packaging regulations and encourage the use of recycled materials.
3.3.4 Provide a platform for extending product utilisation potential using relevant technology.
3.3.5 Provide grants to encourage research, innovation and commercialisation activities.
3.3.6 Encourage industrial involvement in the processing of scrap metal, tyres, disposable diapers and agricultural waste.
3.3.7 Encourage the development of centralised waste parks.
3.3.8 Provide a platform for strategic collaborations between the government and industry.
3.3.9 Encourage the involvement of industry in 3R corporate initiative programmes.
3.3.10 Collaborate with industry to hold annual campaigns.

Strategy 3.4: Implement Extended Producer Responsibility (Epr) To Promote Recycling

3.4.1 Encourage the involvement of industry to implement Extended Producer Responsibility (EPR) through the EPR Implementation Plan.
3.4.2 Create an EPR Roadmap as a guide and reference for stakeholders.
3.4.3 Introduce the Reverse Vending Machine (RVM) to encourage recycling.
3.4.4 Create a platform for engagement sessions between the government and industry, NGOs and educational institutions.

Cluster 4: Governance and Enforcement

Strategy 4.1: Improve the Delivery System and Governance Effectiveness

4.1.1 Develop cleanliness standards to measure the effectiveness and efficiency of the solid waste management and public cleansing services of the Local Authorities.
4.1.2 Expand the scope of solid waste management and public cleansing services.
4.1.3 Enhance effective management of complaints concerning solid waste management and public cleansing services.

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4.1.4 Strengthen cooperation and engagement between the Federal Government and State Governments and Local Authorities.
4.1.5 Reinforce coordination and cooperation between agencies based on their respective jurisdictions.
4.1.6 Utilise technology that is effective, proven, cost-effective and environmentally friendly.
4.1.7 Develop an integrated solid waste database system for stakeholder's application.
4.1.8 Foster cooperation and develop information-sharing networks between the public and private sectors and NGOs.
4.1.9 Reinforce and extend international relations through strategic partnerships in the field of solid waste and public cleansing management.

Strategy 4.2: Increase the Efficiency of Enforcement and Monitoring

4.2.1 Strengthen enforcement by amending existing acts, regulations, guidelines and Standard Operating Procedures (SOP) so as to be clearer, more comprehensive and effective.
4.2.2 Enhance the effectiveness of enforcement by reviewing the fine rates and penalties.
4.2.3 Enhance the effectiveness of enforcement by ensuring that the number of enforcement officers is at an optimal level.
4.2.4 Extend integrated enforcement by involving various relevant agencies such as uniformed bodies, organisations and the community.
4.2.5 Reinforce monitoring by expanding the scope of the C4i (Command, Control, Communication and Computer Integration) system and using closed-circuit cameras.
4.2.6 Encourage community involvement in order to conduct monitoring collectively through the "Let's Do It Right" Campaign.
4.2.7 Introduce self-regulation at organisational and community levels.
4.2.8 Improve the management of complaints and response time by using the iTegur system, mobile applications and hotline.

Cluster 5: Quality and Skilled Human Capital

Strategy 5.1: Strengthen Human Capital Capabilities

5.1.1 Enhance professionalism and the competency of workers in the field of solid waste and public cleansing management.
5.1.2 Improve the perception and image of cleaners through their attire and skill in the performance of their duties.
5.1.3 Forge strategic partnerships in human capital development with educational institutions as well as stakeholders, both local and foreign.

Strategy 5.2: Reinforce Lifelong Learning

5.2.1 Improve productivity and quality of workers through continuous learning to produce highly skilled workers.
5.2.2 Develop solid waste collection and public cleansing management skill certification modules.
5.2.3 Encourage workers to enrol in courses for improving their skills and knowledge such as skill certification programmes.

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7. National Policy on Biological Diversity (2016-2025)

This Policy is a revised version of the National Policy on Biological Diversity 1998. The purpose of revision is to meet the current biodiversity management needs as well as to fulfil Malaysia's obligation under the United Nations Convention on Biological Diversity (CBD). The policy outlines 5 key principles on biodiversity management:

P1: Heritage. Biological diversity is a national heritage. It must be sustainably managed, wisely utilised and conserved for future generations.
P2: Precautionary. The lack of full scientific certainty should not be used as a reason to postpone measures to minimise threats of significant loss of biodiversity.
P3: Shared responsibility. The conservation and sustainable utilisation of biodiversity are the shared responsibility of all sectors of society.
P4: Participatory. Planning and management of biodiversity must be carried out in a participatory manner.
P5: Good governance. Good governance, including accountability and transparency, is crucial to biodiversity conservation.

The policy highlighted the importance of AACB and PPPs and indirectly focussing on water awareness in item below:

GOAL 1: We have empowered and harnessed the commitment of all stakeholders to conserve biodiversity.
Target 1: By 2025, more Malaysians are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

GOAL 4: We have ensured that the benefits from the utilisation of biodiversity are shared equitably.
Target 14: By 2025, Malaysia has an operational ABS framework that is consistent with the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation.

GOAL 1: We have empowered and harnessed the commitment of all stakeholders to conserve biodiversity.
Target 2: By 2025, the contributions of indigenous peoples and local communities, civil society and the private sector to the conservation and sustainable utilisation of biodiversity have increased significantly.

GOAL 5: We have improved the capacity, knowledge and skills of all stakeholders to conserve biodiversity.
Target 15: By 2025, capacity for the implementation of the national and subnational biodiversity strategies, the CBD and other related MEAs has significantly increased.

Principle 3: Shared responsibility. The conservation and sustainable utilisation of biodiversity are the shared responsibility of all sectors of society.
Principle 4: Participatory. Planning and management of biodiversity must be carried out in a participatory manner.

8. Green Technology Master Plan Malaysia (2013-2030)

The Green Technology Master Plan (GTMP) is fundamentally an outcome of the 11th MP (2016-2020) which has earmarked green growth as one of the six game changers altering the trajectory of the nation's growth. The GTMP creates a framework which facilitates the mainstreaming of green technology into the planned developments of Malaysia while encompassing the four pillars set in the National Green Technology Policy (NGTP), i.e. energy, environment, economy and social.

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The master plan focussing on water awareness in highlighting initiative of water utilisation using Water Efficient Products Labelling Scheme (WEPLS). A fact-based educational approach is under planning to improve the effectiveness of promotion and awareness programmes. SPAN plans to conduct a water consumption study in collaboration with KeTTHA at five academic institutions. These studies will analyse the use of water amongst students. Subsequently, educational programmes will be conducted to increase students' awareness of the importance of saving water.

Water harvesting through Promotion and Awareness Programmes such as Raising awareness at primary and secondary schools through collaboration with the NGO Treat Every Environment Special Sdn. Bhd. (TrEES). Hosting technical and academic site visits by the public and educational institutions at several RHS locations, such as Zoo Negara, the Selangor State Government Office, Paya Indah Wetlands and Incubator NAHRIM. Public-Private Collaboration to create Market Enablers were also introduced.

Collaboration of NAHRIM with Persatuan Sistem Pengumpulan Dan Penggunaan Semula Air Hujan (SPAH) and other Government bodies to support:

- Producing local products with more variety of RHSs;
- Setting relatively competitive prices for local products compared to imported products;
- Providing tax exemption on R&D developments of local RHS products; and
- Offering attractive funds for the development of RHS technologies and products.

This can be done by introducing marker enablers:

- Government Green Procurement (GGP)
- Green incentives Innovative financing
- Green cities
- International collaborations

Besides that, Seminars and workshops on RHSs regarding the Design Guide for residential RHS, RHS pilot projects and Tangki NAHRIM, collaboration with universities, learning agencies and technical entities, on a RHS pilot project. NAHRIM also has undertaken 10 RHS projects since 2001. These include residential buildings, religious sites, public spaces, Government headquarters and traditional infrastructures; and providing consultancy and technical advisory on RHS for the public, private players and Government agencies that are required to install or construct RHSs on their premises.

Supporting the capacity building, the master plan also highlighted on initiative for Wastewater Treatment with targeted Promotion of Reclaimed Water and Biosolids. Promotion and awareness programmes have been conducted to increase acceptance of reclaimed water and biosolids. Participation from various stakeholders have shown positive uptake on the utilisation of reclaimed water and biosolids. Some Malaysian local authorities have been using reclaimed water and biosolids for landscaping. In addition to that, the private sector has utilised reclaimed water at construction sites. The master plan also highlighted some important initiative that need to be implemented which were tailored communication strategy, collaboration with industry and business promotion via International Greentech & Eco Products Exhibition & other platforms and collaboration with primary & secondary educational institutions.

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9. National Transport Policy (2019-2030)

The National Transport Policy (NTP) was developed through a close collaboration between the government and private sector. Since September 2016, over 150 members from the government, academia and representatives of the private sector convened in a series of workshops, focus group discussions and meetings.

The objectives of NTP were:

1. Create a conducive ecosystem for the transport industry to enhance productivity and competitiveness;
2. Facilitate seamless movement of goods to boost trading activities and ease of doing business;
3. Provide mobility that meets the expectations of people and promotes inclusivity;
4. Increase modal share for public transport;
5. Deliver an intelligent, safe and secure transport system; and
6. Ensure efficient and sustainable use of resources and minimise environmental pollution.

Under NTP, there were several thrust and strategy that hints on AACB and PPPs. However, it did not mention directly to the IWRM.

Policy Thrust 1: Strengthen governance to create a conducive environment for the transport sector
S1.2: Enhance skills development in the transport sector and make the sector an attractive career option.

Policy Thrust 4: Advance towards a green transport ecosystem
S4.5: Develop an effective communication, education, and public awareness (CEPA) to create behavioural change towards practices of sustainable transport.

Policy Thrust 3: Enhance safety, integration, connectivity, and accessibility for seamless journey for passenger and goods
S3.1: Strengthen enforcement to ensure adherence to rules and regulations to improve safety, service quality and reliability policy.

10. Shared Prosperity Vision 2030

Shared Prosperity Vision 2030 is a commitment to make Malaysia a nation that achieves sustainable growth along with fair and equitable distribution, across income groups, ethnicities, regions, and supply chains with 15 guiding principles and 6 strategic thrusts. The commitment is aimed at strengthening political stability, enhancing the nation's prosperity, and ensuring that the rakyat are united whilst celebrating ethnic and cultural diversity as the foundation of the nation state.

Under SPV 2030, there were several thrust and strategy that hints on AACB and PPPs. However, it did not mention directly to the IWRM or water management.

Vision Enablers: Enlightened Society
- A lifelong learning culture through continuous learning, intellectual discourse, dialogues, and awareness to enhance knowledge, experience sharing and empathy.

Vision Enablers: Governance & Integrity
- Strengthening governance through transparency and accountability to foster trust of rakyat.

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Strategic Thrust 3: Human Capital

- 40% of HDRF training in skills related to 4IR.
- Programme offerings at universities and training institutes will be tailored to the needs and requirements of industries.

Vision Enablers: Education & TVET

- Increase in skilled and highly educated workforce, learning society and outcome-based education.

11. National Community Policy

The National Community Policy, which was approved by the Malaysian Cabinet on 23rd November 2018. The policy aims to empower the community in residential areas, particularly those in social housing (People's Housing Programme), to be actively involved in the management and maintenance of public property. This policy also focusses on building an inclusive community towards the well-being of the people. An interconnected and flourishing community creates a close network and promotes harmony and safe living. The end goal of this policy is to create a sustainable generation and community.

Clusters that supporting the awareness are:

Cluster 2: Cleanliness, Environment and Health
Strategy 2.1: Increase awareness and healthcare in individuals, families and communities.
Strategy 2.4: Increase awareness and knowledge on risks of communicable diseases.

Cluster 7: Social Services
Strategy 7.1: Instil the spirit of volunteerism.

Cluster that supporting the advocacy are:

Cluster 1: Infrastructure and Maintenance
Strategy 1.3: Strengthen the community skills in managing and maintaining common properties.

Cluster 2: Cleanliness, Environment and Health
Strategy 2.2: Increase knowledge and skills in environmental management to ensure cleanliness and a well-protected environment.

Cluster that supporting the Capacity Building are:

Cluster 4: Education and Skills
Strategy 4.3: Improve knowledge and skills amongst community members.

Cluster 1: Infrastructure and Maintenance
Strategy 1.1: Promote strategic collaboration with external parties to improve common infrastructure and properties.
Strategy 1.2: Enhance the community involvement in managing and maintaining common properties.

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Cluster that supporting the PPP are:

Cluster 4: Education and Skills
Strategy 4.4: Establish strategic cooperation with stakeholders to strengthen knowledge and skills amongst community members.

Cluster 7: Social Services
Strategy 7.3: Enhance existing social services in the communities.
Strategy 7.4: Establish strategic social service collaborative networks between external parties and the community.

Under National Community Policy, there were several Cluster and strategy that hints on AACB and PPPs. However, it did not mention directly to the IWRM or water management.

12. Rural Development Policy

The Rural Development Policy (DPLB) has formulated the vision of "Rural Prosperous, Inclusive, Sustainable and Holistic" as the main agenda in the external development process cities in Malaysia by 2030. A prosperous countryside illustrates the Government's desire to ensure rural communities have access to infrastructure and social facilities comparable to the city. Rural areas are targeted to offer employment and business opportunities which can increase the income of the rural population. The policy enrolled with 10 core aspirations. The policy stressed on environment under Core number 9: Biodiversity and Sustain Environmental whereby maintenance and biodiversity conservation as well as environmental sustainability. The approach in sustainable development; raising awareness and responsibilities society as well encouraging eco-friendly living. The importance of water was highlighted under this core aspiration as general environment sustainability.

Policy Statement 1: Biodiversity Concept-Based and Rural Environment Management, Sustainable Consumption and Production Strategies:

1. Protect biodiversity and the environment from unsustainable activities in rural areas.
2. Promote green farming practices amongst rural communities.
3. Integrate traditional knowledge in the management of the rural environment involving the rural communities.
4. Leverage areas identified for rural biodiversity through green economy projects.

Policy Statement 2: A Clean, Safe and Sustainable Environment for Today's Generation and Future
Strategies:

1. Creating a clean, beautiful and sustainable rural environment.
2. Encourage the efficient use of resources to support environmental sustainability.
3. Improving the arbitration mechanism to adjudicate cases of violations and environmental encroachment as well as the human rights of the population.

Policy Statement 3: Protection of Wildlife Habitat Areas and Biodiversity in Rural Areas
Strategies:

1. Monitor the viability and sustainability of areas gazetted as wildlife habitat and biodiversity protection.
2. Address human-wildlife conflicts over settlement areas and economic activities rural.

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13. National Urbanisation Policy 2 (2016-2025)

National Urbanisation Policy 2, 2016-2025 (DPN2) is prepared to continue the steps of DPN 2006 which have not yet been fully implementation. DPN2 has taken into consideration as the following:

i. Current Federal Government policies and State;
ii. Current municipal issues;
iii. National Insights;
iv. 11th MP; and
v. Foreign policies and national policies provision such as Eco2 Cities, COP15 Copenhagen, The Sustainable Development Goals (SDGs), The Global Competitiveness Report and others concerned.

The five (5) main principles of DPN2 are:

PRINCIPLE 1: Good Urban Governance
PRINCIPLE 2: A Liveable City
PRINCIPLE 3: A Competitive Urban Economy
PRINCIPLE 4: Inclusive and Equitable Urban Development
PRINCIPLE 5: Green Development and Clean Environment

The importance of water aspects in the policy was highlighted under principle 5 whereby some initiatives and programmes related to water resources, water conservation, water distribution effectiveness under the responsibility of multi stakeholders.

14. National Consumer Policy (2002)

NDP formulated based on the ecological approach that recognises the interrelation between user and system environment as an economic system, social and political. In particular, users interact with other systems and mutual influences and is influenced by the environment of the system.

NDP formulated with three (3) goals are:

a. Producing enterprising users that perform self-protection efforts and enterprising efforts Users who have access to information and gain the competition benefits using the information, knowledge, and self-reliance. The competitive efforts also for users who are able to protect themselves and be aware of each decision while dealing in the market.
b. Improving self-regulation amongst traders. A self-regulation is the effort to develop, manage, rules market and practices enforced by dealers or operators. It is a collective activity with the participation and consent of all sectors to comply with regulations drafted and agreed upon. Self-regulation is a voluntary activity and the people involved really understand the benefits derived from such efforts.
c. Increasing the effectiveness of consumer's protection. An effective consumer's protection should be the responsibility of all parties. Government plays a role in coordinating the enforcement and overall welfare of consumers and merchants.

The NDP objectives are identified to achieve three goals. These objectives are designed to determine the direction of the NDP goals and outline strategies implementation to achieve those goals. Specifically, the objectives are designed to achieve the goals identified for each of the stakeholders: consumers, businesses, and government. The whole ecosystem will lead to attaining the NDP is to increase the well-being of consumers through fair market practices.

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Produce the competitive capacity and implement self-protection - in order to create a competitive user capacity and implement self-protection by:

i. Enhance the quality, quantity and accessibility of information.
ii. Produce an ethically responsible consumer.
iii. Developing an effective consumer movement.
iv. Improve the ability of consumers who are vulnerable in terms of resources and protection.

Improving self-regulation amongst traders - to enhance self-regulation amongst traders by:

i. Dealer ethical and social responsibility.
ii. Encourage self-regulation amongst traders/producers.
iii. Developing markets concerned users.

Increasing the effectiveness of consumer's protection - to improve the effectiveness of consumer's protection by:

i. Strengthening the legal and regulatory protection.
ii. Develop an efficient system of redress, simple and user-friendly.
iii. Establish a coordination mechanism/coordination between agencies involved in consumer's protection.
iv. Strengthening consumer's protection through the application of standards.
v. xtending protection to the Regional and International.
vi. Develop quality human resources.

Water consumers are one of the main stakeholders of water sector transformation 2040, especially in public participation. It is important to highlight the participation of water consumers in getting feedbacks on the roadmap and strategies.

15. Education Blueprint (2006-2010)

In October 2011, the Ministry of Education launched a comprehensive review of the education system in Malaysia in order to develop a new National Education Blueprint. The result was a Malaysia Education Blueprint that evaluates the performance of current Malaysia's education system with considerations of historical starting points against international benchmarks. The Blueprint also offers a vision of the education system and student aspirations that Malaysia both needs and deserves and suggests 11 strategic and operational shifts that would be required to achieve that vision. The objectives of the blueprints are:

1. Understanding the current performance and challenges of the Malaysian education system, with a focus on improving access to education, raising standards (quality), closing achievement gaps (equity), fostering unity amongst students, and maximising system efficiency;
2. Establishing a clear vision and aspirations for individual students and the education system as a whole over the next 13 years; and
3. Outlining a comprehensive transformation programme for the system, including key changes to the Ministry which will allow it to meet new demands and rising expectations, and to ignite and support overall civil service transformation.

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16. National Physical Plan 3 (2016)

The Town and Country Planning Act 1976 (Act 172) provides the legal basis for the preparation of the National Physical Plan. To ensure its relevancy and usefulness in the fast-changing environment, Sub-section 6B (4) of the Act 172 obliges that the NPP be reviewed every five years in tandem with the review of the Five-Year Development Plan, or as and when directed by the National Physical Planning Council (NPPC).

After ten years of implementation of the NPP and having undergone two reviews, the approach taken in the NPP-3 was not to introduce new spatial planning policies but, rather, to refine and detail out existing policies into strategic directions, strategies, and actions to enhance their implementation. Various sectoral policies including those related to economic, social, and environmental aspects are also incorporated into the strategic direction proposals in the NPP-3.

The emphasis on economic, social, and environmental relations as main components of sustainable development within a holistic ecosystem are reflected in three main thrusts of the NPP-3 namely Dynamic Urban and Rural Growth, Spatial Sustainability and Climate Change Resiliency and Inclusive and Liveable Community Development.

Hence, the NPP-3 emphasis on sustainable development and planning as a key principle in achieving a resilient and liveable nation in 2040. The physical and spatial planning will lead to the inclusion of the main focus of Growth, Resiliency, Liveability and Sustainability.

The goal of the plan is to achieve a resilient and liveable nation with 3 thrust and strategic directions as follows:-

Thrust 1 (DG): Dynamic Urban and Rural Growth

DG 1 - Balanced Urban Growth
DG 2 - Integrated Rural Development
DG 3 - Enhancing Connectivity and Access

Thrust 2 (SR): Spatial Sustainability and Resilience to Climate Change

SR 1 - Sustainable Management of Natural, Food and Heritage Resources
SR 2 - Holistic Land Use Planning
SR 3 - Low Carbon Cities and Sustainable Infrastructure

Thrust 3 (IC): Building Inclusive and Liveable Communities

IC 1 - Inclusive and Quality Living Environment
IC 2 - Liveable Community Environment
IC 3 - Community Participation and Collaboration

The AACB and PPPs aspects were highlighted in Thrust 2 and Thrust 3.

17. Malaysia Smart City Framework (2018)

Malaysia Smart City Framework was launched in 2018 with 7 smart cities components, 36 strategies and 112 initiatives were identified. The rapid urbanisation that has taken place in the last decades has resulted

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in various urban issues such as congestion, pollution, security and deterioration of natural resources. In the global context, smart cities are used as one of the approaches to resolve urbanisation issues and improve the quality of life in the city.

Smart city is seen as a new approach in urban management and development to make Malaysia's cities more sustainable and liveable. At the same time, technological advancement, and the usage of information technology (IT) applications make the smart city more practical and convenient for urban population and city managers.

18. National Renewable Energy Policy & Action Plan (2010)

The objectives of the policy are:

1. To increase RE contribution in the national power generation mix;
2. To facilitate the growth of the RE industry;
3. To ensure reasonable RE generation costs;
4. To conserve the environment for future generations; and
5. To enhance awareness on the role and importance of RE.

19. National Energy Efficiency Action Plan (2015)

The National Energy Efficiency Action Plan presents a strategy for a well-coordinated and cost-effective implementation of energy efficiency measures in the industrial, commercial, and residential sectors, which will lead to reduced energy consumption and economic savings for the consumers and the nation. However, it must be borne in mind that the National Energy Efficiency Action Plan is only confined to electricity usage and does not cover the other aspects of the energy sector.

The aim of the plan is to promote energy efficiency in order to meet the following policy direction:

"PROMOTE ENERGY EFFICIENCY TO ENSURE PRODUCTIVE USE OF ENERGY AND MINIMISE WASTE IN ORDER TO CONTRIBUTE TO SUSTAINABLE DEVELOPMENT AND INCREASED WELFARE AND COMPETITIVENESS".

The National Energy Efficiency Action Plan is supported by 4 main thrusts that will drive the nation towards a sustainable energy path:

Thrust 1: Implementation of Energy Efficiency Action Plan;
Thrust 2: Strengthen Institutional Framework, capacity development and training for Implementation of Energy Efficiency initiatives;
Thrust 3: Establishment of Sustainable Funding Mechanisms to Implement Energy Efficiency Initiatives; and
Thrust 4: Promotion of Private Sector Investment in Energy Efficiency Initiatives.

The National Energy Efficiency Action Plan contains 10 specific energy efficiency programmes covering 3 sectors to be implemented over a 10 year period.

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The programmes can be grouped into 5 key initiatives related to the design of the programmes as follows:

Initiative 1: Promotion of 5-Star Rated Appliances;
Initiative 2: Minimum Energy Performance Standards (MEPS);
Initiative 3: Energy Audits and Energy Management in Buildings and Industries;
Initiative 4: Promotion of co-generation; and
Initiative 5: Energy Efficient Building Design.

20. Malaysian National Environmental Health Action Plan (2013)

National Environmental Health Action Plan (NEHAP) is aimed at enhancing the quality of the environment and public health. The objectives are as follows:

i. To develop and maintain human health and sustainable development in the country.
ii. To strengthen collaboration and cooperation with other sectors for effective use of resources in improving human health and sustainable development.

The following guiding principles form the basis of the Framework on Environmental Health:

i. A focus of activities on the protection of the environment and human health from hazards and a decrease in related mortality, morbidity and injuries in the population;
ii. Enhancement of the roles and responsibilities of governmental and non-governmental organisations, business organisations and the community to reduce environmental impacts on health;
iii. Enhancement of inter-sectoral cooperation through strategic alliances, with the aim of reducing environmental risks to health;
iv. Coordination of the activities of the Framework, Strategic and Action Plans and other projects related to environmental health; effectively allocate funds; and provide assistance, support and cooperation with the public and private sectors and international organizations;
v. Consideration of existing policies and their plans of action; and
vi. The implementation of the program in conformity with the aims of WHO, UN Millennium Development Goals and other international organisations.

Environmental health issues are complex and cut across sectors and agencies, requiring coordination and cooperation amongst them. Government agencies on their own have developed and implemented environmental health related sectors and programmes, which if not properly done will have an impact on human health, especially impacted sectors are water supply, drainage and irrigation, sewerage, transportation, food production, solid waste management, and hazardous waste management.

21. Malaysia Roadmap Towards Zero Single Use Plastics (2018-2030)

The vision of this Roadmap is to take a phased, evidence-based and holistic approach by involving all stakeholders in jointly addressing single-use plastics pollution in Malaysia. This Roadmap is envisaged to deploy actions that can deflect the current trajectory to a more sustainable pathway towards a cleaner and healthier environment by 2030. The Roadmap will be implemented from 2018 leading up to 2030 with an expectation that all relevant stakeholders will play their roles effectively to ensure the objectives of this roadmap are met.

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The roadmap principles are:

a. Shared Responsibility: The responsibility to eliminate single-use plastics waste from the natural environment has to be shared by all the stakeholders including the government, industries, civil society, and the consumers.
b. Sustainable Development: Support the wider national agenda on sustainable development that includes the consideration of economic, technology, environment, development, and social factors.
c. Precautionary Principle: Plastics, as reported have an impact on biodiversity, environment and human health and some of these impacts are still being studied. When an activity raises threats or harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established, scientifically.
d. Participatory: Planning and execution of the Roadmap will be carried out by engaging all the relevant stakeholders in an open and transparent manner.
e. Good Governance: Good governance with appropriate mechanisms including accountability and transparency is crucial for the implementation of the Roadmap.
f. Living Document: This Roadmap will be updated from time to time taking into account advances in technology and real-time circumstances in accordance with national priorities.

There are 4 phases of roadmap as below details:

Phase 1 (2018-2021)

2018:

- Official launching of Roadmap towards Zero Single-Use Plastics in October 2018.
- Nationwide stakeholder engagement in drafting the CEPA programme led by KPKT.
- KPKT to publish a guideline for Local Authority/PBT on the licensing requirement to implement the pollution charge collection.
- Workshop to be conducted for all PBTs regarding single-use plastics and the mechanism and implementation of pollution charge in cooperation with Penang State Government.
- To establish institutional framework and governance structure for the implementation of the Roadmap.
- To establish a dedicated secretariat to coordinate, monitoring and to facilitate the implementation of the Roadmap.
- SIRIM Berhad to lead the revision of ECO001 criteria document to include only biodegradable and compostable products and excluding photo and oxo-degradable. New ECO001 criteria document to be published.
- Technical guidelines on biodegradable and compostable products for State Governments.
- R&D funding on alternative eco-friendly products.

2019:

- 'No straw by default' practice where straw is given upon request with no charge. Will be implemented in fixed premises (See page 14 of the Roadmap).
- Local government authorities nationwide to utilise compostable garbage bag for garden waste collection.
- Customers encouraged to bring their own food container or the food business operator at fixed premises (as per page 14) will sell food containers that complies ECO001 and ECO009 to replace polystyrene and plastic food packaging.

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- States will impose a pollution charge at a minimum of RM0.20 for plastic bags. Nationwide implementation by end of 2021.
    - Each state will decide the implementation time (from 2019 till 2021);
    - Applicable to fixed premises as per page 14; and
    - Plastic bags will be sold as SKU product with barcode.

Note: The above is the minimum standard notwithstanding the right of States to take action that is more protective for addressing plastic pollution.

- Expand Bionexus equivalent status and other incentives to ECO001 resin manufacturers and ECO009 product manufacturers.
- Rapid testing kit for ECO001 compliant material (starch-base) introduced.
- Review existing laws/develop legal framework on single-use plastics.
- Develop a regional marine debris project for external funding such as Global Environment Fund (GEF) to be implemented in Phase II.
- A comprehensive CEPA programme developed and deployed by KPKT.

2020:

- A Circular Economy Roadmap (CER) for plastics including bottles launched by 2020 to be implemented in Phase II.

2021:

- Technical workshop in developing capacity of all stakeholders in implementing CER.

PHASE 2 (2022-2025)

2022:

- Widespread uptake of bio bag nationwide replacing plastic bags and sold as SKU item.
- 'No straw by default' practice continues and extended to non-fixed premises. SKU ECO001 straw (bio straw) will be introduced including straws for packet drinks.
- Expansion scope of biodegradable and compostable products:
    - Food packaging;
    - Plastic film;
    - Cutleries;
    - Food container;
    - Cotton buds;
    - Polybags and plant pots; and
    - Slow release fertilisers.
- Implementation of CER for plastics including bottles and other single-use product.
- Implementation of minimum pollution charge on plastic bags continues and extended to non-fixed premises by 2025.
- The Federal Government will impose a pollution levy to manufacturers of plastic bags.
- The pollution levy collected will be managed in a transparent manner. The fund will be used for redressing plastic pollution, research and development (R&D) on eco-friendly alternatives, incentives to manufacturers and CEPA activities.
- R&D funding on alternative eco-friendly products.

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- Rapid testing kit for ECO001 compliant material (PHA and other products) developed.
- Introduction of legal framework on single-use plastics.
- Implementation of a regional marine debris project.

2023:

- A mid-term review of this Roadmap will be conducted, and a report will be published.
- Experiential learning integrated into the education system.
- Review CEPA's implementation by KPKT.

Phase 3 (2026-2030)

2026-2030:

- Substantial increase in the volume of production of local biodegradable and compostable alternative products for local consumption.
- Expansion scope of biodegradable and compostable products:
    - Single-use medical devices (e.g. catheter);
    - Diapers & feminine hygiene product; and
    - Other single-use plastics that cannot enter the circular economy.
- R&D funding on alternative eco-friendly products.
- Rapid testing kit for ECO001 compliant products deployed.
- CEPA programme continues.

2030:

- An implementation report of the Roadmap will be published.

22. Communications and Multimedia Blueprint (2018-2025)

Communications & Multimedia Blueprint 2018-2025 (Blueprint) was developed with three objectives which were:

- To position the communication and multimedia sector for sustainable growth amid digital disruption and broader technological advancement.
- To accelerate the growth and transformation of other sectors of the economy.
- To create a connected, informed and empowered society.

23. National Policy on Science, Technology and Innovation (2021-2030)

The new National Policy on Science, Technology & Innovation (NPSTI) describes an agenda to advance Malaysia towards a more competitive and competent nation built upon strong STI foundations. The policy is formulated based on the nation's achievements, challenges and lessons learnt. It charts new directions to guide the implementation of STI in creating a scientifically advanced nation for socio-economic transformation and inclusive growth.

The NPSTI is grounded on the following five fundamental foundations namely:

1. STI for Policy;
2. Policy for STI;

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3. Industry Commitment to STI;
4. STI Governance; and
5. STI for a stable, peaceful, prosperous, cohesive and resilient society.

24. Ministry of Water, Land and Natural Resources Strategic Plan (2019-2023)

The restructuring of the Cabinet on 2 July 2018 has led to the establishment of the Ministry of Water, Land and Natural Resources (KATS) which is responsible for the management of water, land and natural resource, then later, in 2019 the profile of water management was foreclosed to Kementerian Alam Sekitar dan Air (KASA).

The strategic plan for water was derived as priority are under water resources and water supply and sewerage with core to strengthening water management towards national prosperity.

Under priority area 1: Water Resources, 4 strategies were derived as below:

STRATEGY 1: Strengthen effective and sustainable water resources management.
STRATEGY 2: Reduce the risk of water-related disasters, preparedness and response.
STRATEGY3: Strengthen expertise, information sharing and services consulting in Research, Development, Innovation & Commercialisation (RDIC) water related.
STRATEGY 4: Strengthen Communication, Education and Public Awareness (CEPA).

Meanwhile under Priority areas II: Water Supply and Sewerage, 8 strategies were derived as below:

STRATEGY 1: Strengthen the implementation of the water policy and regulatory framework.
STRATEGY 2: To increase the financial capability of water and sewerage companies towards full cost recovery.
STRATEGY 3: Strengthen the direction of water and sewerage asset capital financing (CAPEX).
STRATEGY 4: Improve the effectiveness of regulatory governance.
STRATEGY 5: To develop the economic sustainability of the water services industry and sewerage.
STRATEGY 6: Strengthen research and development in the field of water services and sewerage.
STRATEGY 7: Strengthen international networks in water supply services and sewerage.
STRATEGY 8: Ensure adequate water resources and supply capacity.

The importance of AACB and PPPs was highlighted in the strategic plan.

25. National Integrated Water Resource Management Plan (2016)

The NIWRMP Road Map accompanying the report prepared by Academy Science of Malaysia in 2016 comprises a detailed list of strategies broken down under 4 discrete elements, namely, Enabling Environment, Institutional Framework, Management Instruments, and Investments in Water Infrastructure, for implementation by relevant water related Ministries consistent with their respective mandates.

Conforming to the General IWRM Framework to ensure balanced development, the strategies were further listed under 2 distinct categories, namely "Water as a Resource" and "Water for Livelihood".

In the roadmap strategies, few AACB and PPPs initiative has been proposed as below:

Management Instrument

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Water as a Resource
Hierarchical level: River basin
Category No. 7: Participatory Management
Strategy No. 1: Community participation in lakes and rivers watch programmes.
Strategy No. 2: Formation of "rakan sungai" and "rakan tasik" groups.

Water as a Resource & Water for Livelihood
Hierarchical level: National
Category No. 9: Awareness, Advocacy and Capacity Building
Strategy No. 2: IWRM awareness and participatory modules targeted at NGOs and CBOs.

Water as a Resource & Water for Livelihood
Hierarchical level: National
Category No. 9: Awareness, Advocacy and Capacity Building
Strategy No. 3: Advocacy modules on IWRM tailored at political leaders.

Water as a Resource
Hierarchical level: National
Category No. 9: Awareness, Advocacy and Capacity Building
Strategy No. 1: Holistic training to O&M personnel comprising a blend of common IWRM modules and specialised training pertaining to resource management.

Water for Livelihood
Hierarchical level: National
Category No. 9: Awareness, Advocacy and Capacity Building
Strategy No. 1: Holistic training to O&M personnel comprising a blend of a common IWRM modules and specialised training pertaining to resource management.

Water for Livelihood
Hierarchical level: National
Category No. 7: Participatory Management
Strategy 14: Engaging the Consumers/Farmers and the Public in Water Conservation Initiatives.

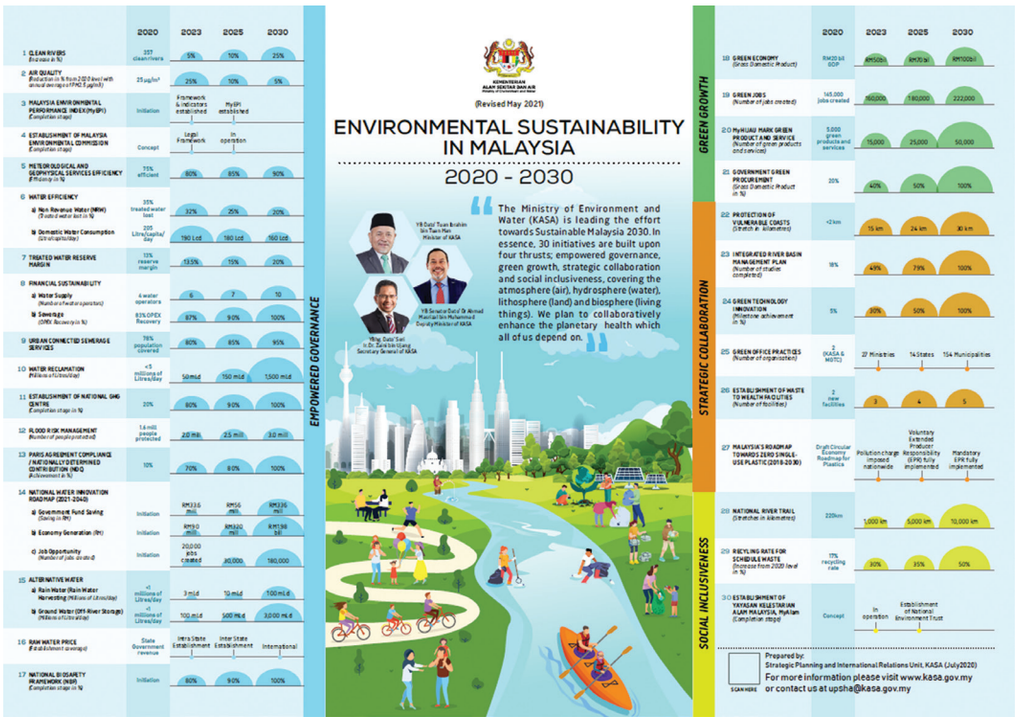
Institutional Framework

Water as a Resource
Hierarchical level: National
Strategy No. 6: National Training Centre.

26. Strategic Plan (2020-2030): Environmental Sustainability in Malaysia

The Ministry of Environment and Water (KASA) is spearheading efforts towards a Sustainable Malaysia 2030. In principle, 26 initiatives were developed based on 4 main pillars: Empowered governance, green growth, strategic collaboration, and social inclusiveness; covers the atmosphere (air), hydrosphere (water), lithosphere (land) and biosphere (living beings).

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5.1.2 Proposals for Improvement of Policy (ies)

The importance of water management was emphasised in some national policies. There are strategies, thrusts, plans on water-related awareness-raising, advocacy, capacity building and public participatory platforms. Most of the existing program emphasises integration or collaboration of Quadruple Helix stakeholders, i.e., Government, Business and Industrial, Academia, and Community that includes all hierarchies.

- Inclusivity in data sharing. Data is an important component for decision making. In Europe, the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters, famously known as the Aarhus Convention, requires greater access to data for the public to make good decisions in environmental matters. There is no such provision in the ASEAN region, let alone in Malaysia. Compared to the websites of agencies in Europe, America and Australia, there are relatively lack of data on the website of agencies in Malaysia, and there are data which will be released upon certain payment. Thus, concerted efforts are needed for the government agencies to make data readily available on their website to ensure public can make good judgement for their community.

It is recommended that the Official Secret Act to be amended to exclude information relevant for environmental decision making. In the case of Malayan Trade Unions Congress (MTUC) & Ors v Minister of Energy, Water and Communications & Government of Malaysia (Civil Appeal No: 01(f)-6-03/2013(W) the MTUC pursued against the Government for access to an audit report and the concessionaire agreement with Syarikat Bekalan Air Selangor Sdn Bhd (SYABAS). The court satisfied that the MTUC had a genuine interest in the document but denied access to both documents on the ground of official secret document. The decision relaxed the law on locus standi by allowing anyone who has genuine interest in clean environment to bring an action in the court but denied access to data and official documents relevant to environmental matters.

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- Capacity building and empowerment. At the moment, only officers in water-related agencies are well aware of the water management concept and issues in the country. Not many local government officers, who are dealing with water related problems faced by the public, understand and well-equipped with knowledge and know-how to manage, identify and prevent water related disaster. There is thus a vital need to institutionalised capacity building on water resources management amongst local government officers and the general public.[2] The capacity building and the training module should consider improvement on Water Framework Directives for effective overall environmental governance. The capacity building centre can also act as a focal point for all NGOs as well as all relevant platforms of multi stakeholder sectors to share their knowledge and concerns on water issues faced by the public. It may also act as the data centre on water related matters for all stakeholders.

- Enhancing the sense of ownership. As people are relying on water supplies from the tap, then forget that water comes from the river. They may or may not even know the name of the river nearby and the bigger river basin where they live. It is suggested that a new policy to address this issue by ensuring new development to include the name of the river and the river basin in their advertisement. Instead of just highlighting that new homeowner will enjoy the lake view or the river view, they can include the fact that "new owners will enjoy living near a scenic Sungai Lui, a sub-basin of Langat River".

Such requirement can be imposed by the local government when granting planning permission to the developer under section 21A (1A) of the Town and Country Planning Act 1972. At the moment, the law only requires the developer to include an analysis of the social implications of the development. As a matter of fact, the development will have a direct and indirect impact on the river or the river basin. It is thus natural for the public to understand the rivers and the river basin where they are going to live in and appreciate the nature and status of the river nearby.

- Embedded the IWRM principles in Agriculture practices through AACB programmes. In the agricultural sector, farmers' involvement in water resource management needs to be enhanced through their participation in the operation and maintenance of irrigation infrastructure. The implementation of AACB programmes will help in decision-making for development, particularly in land use change.[3]

Public Participatory Platforms (PPPs)

Align with 12th Malaysian Plan, it is suggested that public consultation platform must be established at the state and district levels as a platform for the public to engage and consult on the management of the water sector matters. This platform is essential for the community and water users, especially the indigenous people. There is no separation of the indigenous community in community cluster. If there are indigenous people in the targeted river basin, they will be trained as Community Leaders. For the PPPs they can use the platform listed for the community. The members shall be empowered and equipped with the capacity building and skills, especially in conflict resolution and negotiation to ensure the effectiveness of the platform. This platform will be leveraged to support the National Water Council decisions via the AACB WST2040 water hub. Adequate funds for non-structural capacity building towards IWRM, comprehensive AACB programme at the PPPs through National Water Grant programme are some examples of strengthening PPPs.

[2,3] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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For too long, Indigenous People have been kept out of decision-making and disregarded by the mainstream environmental movement. In AACB, there is no separation of the indigenous community in the community cluster. If there are indigenous people in the targeted river basin, they will be trained as Community Leaders. For the PPPs they will use the platform listed for the community. As a matter of fact, they have a closer relationship with rivers and forests, and their traditional ecological knowledge is very essential and useful.

National Communication Plan

A strategic national communication plan must also be developed to ensure that the WST2040 is implemented effectively. It is recommended that a dedicated communication team to be established to plan, execute, promote and coordinate communications for 2040 Roadmap implementation, especially via the aspirations of AACB to empower people for IWRM. The communication team comprising communication professionals will continuously deliver consistent messages regarding IWRM to help achieve changes in stakeholders' behaviour and mind-set towards the water sector.

Impact & Outcomes-Based Approach

WST2040 needs a monitoring instrument or tools to measure the outcomes & impact of the strategies planned throughout the four Malaysian Plan. The instrument should include a review of progress and assessment in implementing the strategies, plans, and roadmaps of each WST2040 Sub-Sectors. It also should be able to review and build consensus on any action plan decided in the first cycle for future improvement of plans and roadmaps.

WST2040 moves and implements the strategies into the four phases. This will include the formation of a Monitoring Committee. The system will have to be designed based on the requirements of the Monitoring Committee. The IWSDC Sub-Sector will design and develop an instrument for all sub-sectors to measure the proposed impacts and outcome-based approach.

5.2 TOR Scope 2 (Undertake Comparative Strategy Analysis/Business Models with other nations)

AACB Sub-Sector has compiled the success stories of AACB and PPPs for Water Resources Management by other countries as benchmarking exercise. The success stories were analysed via content analysis. The information will be tabulated categorically while making comparison with the strategies of Malaysia. Water management programmes and activities of the following countries are seeming to be suitable with regards to Malaysian condition, and also relevant to AACB. The list of the countries studied was United Kingdom, Australia, Sweden, Finland, Singapore, South Korea, and Mekong River.

a. In comparison with United Kingdom, AACB Sub-Sector examined water awareness campaigns in Malaysia that intend to shape water users' habits and perspectives on water, to create responsible water citizens. Example of campaigns in Malaysia and United Kingdom that intend to shape water users' habits and perspectives on water, to create responsible water citizens as tabulated in **Table 5.2** below.

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Table 5.2: Example of campaigns in Malaysia and United Kingdom

Malaysia	United Kingdom

• 22 April - World Earth Day.
• 5 June - World Environment Day Public.
• 16 September - World Ozone Day Public.
• 21 October - National Environment Day Public.
• Environmental Awareness Camps for School & IPT Students.
• Environmental Partner Programmes;
  ◦ National River Trail
• Friend of River.
• Mutual aid activities near the river area.
• River Rangers with NGOs.
• Public River Scientist Fellow.
• School & IPT Students.
• Sustainable School Award Environmental Award;
  ◦ Module of management/importance of water resources for Primary & Secondary School Students
• Environmentally themed exhibitions Public.
• Environmental Speeches of School & IPT Students.
• Langkawi Awards Environmental Sustainability Government Agencies, Public, Corporate Bodies, Private and Non-Governmental Organisations.
• 3 Minute Thesis Competition Environment Malay Students IPT.
	• The Our Rivers campaign was an unofficial public comment process, initiated by green non-governmental organisations in parallel to the Environment Agency's consultations, aimed at including local knowledge and more ambitious measures into the final River Basin Management plan (RBMPs).

b. AACB Sub-Sector examined initiatives that promote grassroots advocacy with the goal of creating a network of trained water advocates in-country, states and/or districts between Malaysia and Philippines.

In terms of advocacy, Philippines adopted:

1. "Adopt an Estero Program" in 2012 was one of the programmes under the Environmental Management Bureau (DENR-EMB). In this programme, 430 Memoranda of Agreements (MOAs) were signed with 232 water bodies nationwide. This programme involves participation of the community in collecting and managing water quality data of the adopted water bodies.
2. Watershed Management Youth Council (WMYC).
3. Watershed Code was drafted and adopted in 2007 to integrate the various initiatives in the basin (Hearne 2010).
4. Promote watershed management advocacy amongst the Davao City student leaders and advocates.
5. Participation of women in terms of the provision, management, and safeguard water resources. Decision making in water resources management is no longer considered a strategic-level issue.
6. Flood Mitigation and Management Programme: FMMP transmitted warnings of possible flooding by two-way radio or mobile phone to village volunteers in the project areas. Red Cross volunteers in the villages then wrote up the forecasts on notice boards at prominent village locations and passed on through word-of-mouth.

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Management phases and institutional strengthening (top-down but bottom-up enablement) - Philippines had successfully conducted a river basin management or coordination amongst multi helix stakeholders.

- Citywide Watershed Management Council (WMC) to author the Watershed Management Code.
- 8 river basins; management is integrated under the Watershed Management Ordinance.
- In 1998, Talomo-Lipadas Rivers, the initiative on Philippines-Canadian Environmental and Economic Management Committee to increase the health of the river.
- Davao River Conservation Coordinating Committee (DRCCC).
- Local NGOs coordinate the role in effective participation, collaborating with Catholic Relief and Services (CRS).
- 1974: the National Water Resources Board (NWRB) established to coordinate the use of water for different purposes.
- 1999: Davao River Conservation Coordinating Committee (DRCCC).
- 2007: The City Council approved the Watershed Management Code.

Performance and accountability - Who takes the leadership.

- HELP (Hydrology for the Environment, Life and Policy) – Davao; management of city's water and environment.
- HELP Davao Network and International training on water management (Khan, 2011).
- Twinning programme with Murrumbridgee 'HELP Demonstrational' River Basin in Australia has expanded the network of technical cooperation and exposure of the city government.
- The framework under local government, a Local Executive Order was issued in the formation of city-wide Watershed Management Council (WMC).

Table 5.3: Comparison of Malaysia with Philippines

Advocacy	Malaysia	Philippines
Local Authorities/Government	Medium	High
Women empowerment	Medium	High
School empowerment	Medium	High
Youth empowerment	Medium	High
Leadership empowerment	Medium	High
Community empowerment	Low	High

c. AACB TF has undertaken a comprehensive review of the literature on capacity building and training for IWRM for WST, with the aspirations of providing suggestions and recommendations for multiple stakeholder groups at the scales of federal governments, state governments, local authorities, individual utilities, and intermediate units of governance while comparing between Malaysia and Mekong River and Singapore.

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Table 5.4: Comparison of capacity building and training

Country	Details
Malaysia	There is limited water training centres which lead to poor training rate in water management. Thus, it will be difficult to ensure effective implementation of AACB WST2040 schemes and programmes to incorporate all the relevant stakeholders of water sector in Malaysia. Existing water academies in Malaysia: 1. Indah Water Training Centre, Indah Water Konsortium (IWK). 2. Institut Pembangunan Modal Insan (IPMI), Department of Irrigation and Drainage. 3. Environment Institute of Malaysia (EiMAS). 4. Malaysia Water Academy (Malaysia Water Association). 5. Penang Water Services Academy (PWSA). 6. Water Academy, Ranhill SAJ.
Singapore	The Singapore Water Academy (SgWA) The Public Utility Board (PUB), Singapore's national water agency, has set up The Singapore Water Academy (SgWA), a leading training institution offering specialised programmes for water professionals both internationally and locally. The Academy develops competency-based curricula to build on current engineering competencies and develop future capabilities to enhance the engineering skills of the industry for the next phase of growth.
Mekong Region	Mekong Region Futures Institute (MERFI) activities include: 1. The analysis of development investment options by applying complex system tools and by improved cross-sectoral coordination. 2. The implementation of participatory processes to facilitate learning amongst decision making agencies by eliciting, analysing and explaining cross-sector trade-offs of development investments amongst government agencies, universities and research institutions, and civil society. 3. The facilitation of cross-sector dialogue to share experiences about development investments and to minimize cross-sector trade-offs. 4. The development of license-free data and analytical tools provided to government agencies, including comprehensive training. 5. The training of Government agency staff in the Greater Mekong Subregion (GMS) to assess sustainability-related outcomes of development decisions, promoting improved national efficiencies in: • sustainable national and regional development • maintenance and improvement of ecosystem services • community capacity to adapt to climate change • poverty reduction • well-being and more resilient livelihoods • ability to compete in the world market
Finland	Finnish Environment Institute SYKE Finnish Environment Institute SYKE offers expertise on vast management measures for rivers, streams and brooks, ranging from small forestry brooks to large hydropower streams and offers deep ecological understanding with profound hydrological modelling capacity. The special areas of expertise include improving water status and using scientific knowledge in restoration. A multi-criteria assessment method helps in the comparison of cost-effective options and ensures stakeholder participation in the planning phase. Water quality and biological monitoring before and after restoration give information on how the goals of the restoration have been attained.

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d. Comparison between Malaysia and Finland in terms of water management at the River Basin level (Water is our DNA) - Water Framework Directives

Finland is a country located in northern Europe symbolising the northern border between western and eastern Europe. The strategies used for enabling environment in Finland are laid down in the Act on the Organisation of River Basin Management and Marine Strategy, Government Decree on Water Resources Management and Government Decree on Water Resources Management Regions. The water resource management in Finland is led by the Ministry of Environment and the Ministry of Agriculture and Forestry. A national programme is adopted, such as Programme of Measures (PoM) to implement River Basin Management Plan (RBMP). To make this programme successful, management instruments were used to define responsibilities and cooperate all stakeholders to make sure the measures and instruments are concrete and well known. Besides that, a monitoring system also had been adopted.

Other additional instruments that have been used are rehabilitation of water bodies, education and research (Keto & Gustafsson, 2020). However, due to the transboundary river issues between countries, Finland had to institutionalise the transboundary cooperation between Finland and its neighbours, but this cooperation is considered not necessary in adapting the river agreement because of the implementation of the convention where Finland involves in the process of ratifying it. To overcome this problem, a clear definition in basin cooperation and participation of all basin countries is needed to address the IWRM, especially in issues related to sustainable development, management, use and protection of transboundary water (Honkonen & Lipponen, 2018).

Finland's AACB and PPPs Initiatives

i. Finnish Watercourse Restoration Network

An open platform for all that provides information and experience on improving the status of water. Campaigns, information sharing via websites, newsletters and social media. Good practices for water protection and restoration, success stories, challenges and failures, use of aquatic ecosystem services.

ii. Lake Vesijärvi Foundation

- Secure funding for research, maintenance, and management efforts.
- Improve the awareness of Lake Vesijärvi by many kinds of communication.
- Promote efforts to improve the water quality of Lake Vesijärvi.
- Prepare a plan for lake management.

iii. Finnish Environment Institute SYKE

Finnish Environment Institute SYKE offers expertise on vast management measures for rivers, streams, and brooks, ranging from small forestry brooks to large hydropower streams and offers deep ecological understanding with profound hydrological modelling capacity. The special areas of the expertise include improving water status and using scientific knowledge in restoration.

Preparation of a restoration project includes the choice of physical, chemical, and biological measures and catchment area management techniques to be applied in the target. Ecological flow implementation and a range of ecological compensation options are used for hydropower mitigation. A multi-criteria assessment method helps in the comparison of cost-effective options and ensures stakeholder participation in the planning phase. Water quality and biological monitoring before and after restoration gives information on how the goals of the restoration have been attained.

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Table 5.5: Comparison with Finland

Categories	Malaysia	Finland
Information and data	Sectorised	Finnish Watercourse Restoration Network
Fund and Finance	Sectoried	Government
Citizen science	Low exposure	High involvement

Lesson Learned

1. Top-down approach is balanced with the bottom-up initiatives.
2. Finnish Watercourse Restoration Network as an open platform for all that provides information and experiences on improving the status of water.

e. Comparison between Malaysia and Germany in terms of The RhineNet programme (Democracy is giving back to the community) and Mekong River Basin Commission. The comparison as discussed in **Table 5.6** below:

Table 5.6: Comparison with other countries

	Malaysia	Mekong River basin Commission	Rhine Net Programme
Public Participation Framework and guideline	No framework has yet established or guidelines	Structure River basin governance Mekong River basin Commission	Harmonising Collaborating Planning (HarmoniCop) was designed to improve public participation. This derived from new European Water Framework Directive incorporates the approach of River Basin Management Planning. Fifteen partners from Belgium, France, Germany, U.K., Hungary, Italy, Netherlands, Spain and Switzerland are involved in the project which each represent a unique network of water-related expertise. The project's objective aims to generate useful information about public participation in River Basin Management Plan (RBMP) will be supported by external advisers constituting a stakeholder platform. Representatives from NGOs, local government, policy making, water industry and farming served as external advisers during project implementation. Since the beginning of the project in November 2002, the project partners have already received a lot of interest from the public. The project ends in October 2005.

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	Malaysia	Mekong River basin Commission	Rhine Net Programme
Decision making platform	Through water forum (Occasional)	MRC acts as the primary forum for cooperation and the only one established by a treaty (the 1995 Mekong Agreement) of four sovereign states. While the responsibility for planning, design and implementation of development projects and water resources management lies with each Member Country, the MRC is mandated to promote sustainable development and coordinate management from a basin-wide perspective. In seeking to fulfill its mandate to foster cooperation and contribute to regional integration in its mandated water and related sectors, the MRC and its Member Countries have sought to build cooperation with strategically important partners.	Through river basin organisation
Governance	State level	Country level	State level
Fund & Finance	• Based on yearly budget (State/Federal)-based on requirement only • Mainly supported by Non-Governmental Organisation/ Community Based Organisation (N), Private business (P), Consultant/ contractor (C)	Through commission	Government must allocate fund and finance as per community demand
Capacity development	Lack of research and training in developing water plans and capacity building amongst water planners.	More research and training in developing water plans and capacity building amongst water planners.	More research and training in developing water plans and capacity building amongst water planners.
Authority	Some state in Malaysia under Enactment established water board/ authority such as LUAS, LSANK, LAUT, BAKAJ and Kuching water Board. The limitation of this arrangement is the authorisation of river basin crossing more than 1 state.	Mekong River basin Commission	Rhine Net Basin Authority

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Lesson Learned

1. Germany collaborates with other countries to jointly manage Rhine Basin. The management programme for Rhine River Basin was taken care of by a committee that is represented by few states within the river basin.
2. The Rhine Net River approach is to create an enabling environment that attracts people to get close to the river and to take care of their river basin.

f. Comparison between Malaysia and Singapore in terms of Active, Beauty, Clean (ABC) Waters Programme

Singapore implemented integrated urban water resource management through Active, Beautiful, Clean (ABC) Waters Programme. Active, Beautiful, Clean (ABC) Waters Programme was launched in April 2006 as part of PUB's larger strategic objective to bring people closer to water so that Singaporean can better appreciate and cherish this precious resource. Before Singapore role for the implementation of ABC programme, the buy-in process has not been so easy as expected. The Active, Beautiful, Clean Waters Programme started with getting the buy-in from political leaders, building rapport with the public by intensive awareness campaign until the first demonstration site was launched started in Kolam Ayer, followed by projects in Bedok Reservoir and MacRitchie Reservoir (Public Utilities Board, 2019).

Under the Active, Beautiful, Clean Waters (ABC Programme, Singapore has optimised reservoirs, rivers, and canals beyond their traditional functions of channeling water and water storage. Pockets of community spaces now offer a host of recreational options for people to enjoy, transforming Singapore into a vibrant City of Gardens and Water. More than 100 potential locations are identified for the implementation of this programme by 2030. The process of the ABC programme is shown in **Figure 5.1** below.

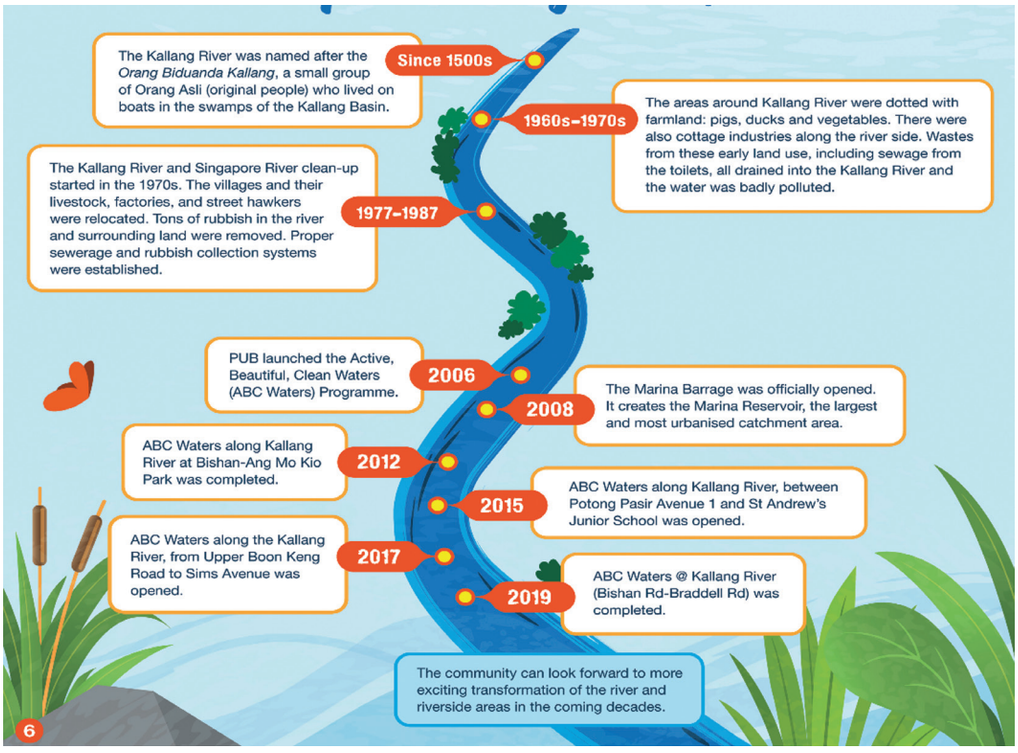


Figure 5.1: ABC initiatives at Kallang river, Singapore (Public Utilities Board, 2019)

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To deal with multi stakeholder, Singapore adopts 3P (People, Private, Public) Network to engage people, the private and public sectors holistically to give life to PUB's water management projects. The 3P Network would later form the pillar of the ABC Waters Programme, which is based on a tri-sector approach to bring together and work with multiple stakeholders. The inter-agency exchanges have supported the implementation of Active, Beautiful, Clean Waters Programme.

Some initiative to recognise and boost volunteerism involvement, PUB introduced (Centre for Liveable Cities, 2017):

1. Watermark Awards that recognise individuals and organisations for their outstanding contributions towards the water cause.
2. Recognition to organisations and members of the public who are keen in raising awareness on water conservation and organising water related activities are welcome as Friends of Water.

PUB recognised that there was a need to build capacities through certification and professional programmes towards ensuring liveable cities including (Centre for Liveable Cities, 2017):

1. ABC Waters Certification Scheme.
2. Green Mark Scheme.
3. ABC Waters Professional Programme.

Lesson Learned

1. The concept of Integrated Urban Water Resource Management can be one of the options for AACB and PPPs programmes in Malaysia.
2. However, strategic, and comprehensive planning must be made as the project might be costly and the sustainability of the project must also be considered.
3. The collaboration amongst stakeholders is vital to ensure the project is successful and sustainable.

g. Comparison between Malaysia and South Korea in terms of Saemaul-Undong 'Community Driven Development' village programmes

The concept South Korea in terms of Saemaul-Undong 'Community Driven Development' village programmes are (Asian Development Bank, 2012):

1. Improving Quality of Life and Competitive Power in the local community.
2. Quantitative Regional Growth and Changing Economic Structure, Participation, Growing Enjoyment.
3. Increasing Regional Wealth and Job Creation.

The major aim of the SU movement is to overcome what at the time appeared to be endemic rural poverty in the Republic of Korea. In the early 1970s, 33,267 mauls (traditional villages) participated in the SU movement. In each maul, male and female Saemaul leaders were democratically elected at a village general meeting. The outward achievements of the movement included rehabilitation of village infrastructure, improvement in the overall rural living environment, and a significant increase in household income. Implementation of the SU movement took place in three successive stages that focussed on basic infrastructure (Stage I); development (Stage II); and dissemination (Stage III), by which is meant to broadening of the populace who embraced the principles that led to the movement's success in both medium and the long term.

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Saemaul Undong's AACB and PPPs Initiatives

1. Training Programme – 1-week isolated training camp/11-week training camp
2. Saemul Leadership Training
3. Training Institute for Saemul Leaders

The comparison of Malaysia with South Korea as listed in **Table 5.7** below.

Table 5.7: Comparison with South Korea

Criteria	Malaysia	South Korea
Capacity development for community	Low and not specific structured, currently	High and structured using role play
Public-private partnership	Low Public-Private Partnership Gearing up for Local & Regional Development	High Public-Private Partnership Gearing up for Local & Regional Development

Lesson Learned

1. Isolated training camp for capacity development.
2. Emphasis on political influence and strong leadership is important.
3. Bottom to top approach in the public participatory platform.

h. Comparison between Malaysia and Australia in terms of IRBM Governance.

In Australia, water is governed by the state government rather than the federal government. Water governance responsibilities are divided into 5 categories, namely policy, service, provision, economic regulation, environmental regulation, and health regulation.

South Australia has over 20 years of experience with integrated approaches to water and natural resources management. Three different approaches were executed from 1970 until 2014. The first approach was the water advisory committee formed to oversee the water allocation and its engagements. The water advisory committee was formed from Water Resources Act 1976.

For the community approach, the neighbors could be involved as the committee in making decisions on water allocations and on water license application. In this approach, the main challenge was the government could not fund the demands recommended by the community. The second approach was in mid-1990 in which the Legislation in 1995 of the Water Management Act and Water Resources Act 1997 which enabled the establishment of catchment water management boards. The third approach was the Natural Resources Management Act in 2004 which re-appealed the Water Resources Act (1997) as well as Soil Conservation and Land Care Act (1989). The main objective was to draw together organisations and individuals across a diversity sectors, linking the natural systems and interaction of economic, social, and environment factors in decision making.

The main challenge was the key managers were not familiar enough with the legislation process. To have proper holistic in the scales of implementation, coordination of all water resources such as surface water, groundwater, water quantity, flooding, desalinisation, upstream and downstream issues were highlighted. The South Aussie government has always been consistent in its integrated approach, for example on the Natural

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Resources Management (NRM) 2004 bill (Mitchell, Bellette, & Richardson, 2014). In Melbourne Australia, Integrated Urban Water Management (IUWM) and Water Sensitive Urban Design (WSUD) is a long-term planning to include community outcomes in involving all stakeholders, service operator, and water sources (Furlong et al., 2016). The comparison is discussed in **Table 5.8** below:

Table 5.8: Comparison between Malaysia and Australia in terms of IRBM Governance

Criteria	Malaysia	Australia
Governance	State level	State level
Public Participation Decision Making (policies/law, legal, etc.)	Lack of community participation in decision making process through non-government organisation and community-based organisation	Strong community participation in decision making process through committee river basin establishment
Legal instruments	State water resources enactments.	Legislation in 1995 of the Water Management Act and Water Resources Act 1997
Fund & Finance	• Based on yearly budget (State/Federal)-based on requirement only • Private business (P), Consultant/contractor (C)	Government must allocate funds and finance as per community demand
Capacity development	Lack of research and training in developing water plans and capacity building amongst water planners.	More research and training in developing water plans and capacity building amongst water planners.
Authority	State established their water resources authority. The limitation of this arrangement is the authorisation of river basin crossing more than 1 state.	The authority was developed based on river basins such as Murray–Darling Basin Authority (MDBA)
River basin monitoring	Monitored by sector	The Sustainable Rivers Audit (SRA) Integrated Basin Reporting framework

Lessons Learned

1. The Basin Community Committee (BCC) is the Public Participatory Platform that has helped the Commission successfully in obtaining and maintaining community interest, as well as their involvement and supports.
2. Resource condition outcomes are more likely to be achieved where formal targets have been identified, and the accountability to achieve these targets are clearly identified and agreed by governments.
3. The strategies for action, programmes and frameworks have benefited from intergovernmental (top-down) approaches coupled with bottom-up actions, although determining how an equitable cost-sharing arrangement can be set up, implemented and maintained, has been a challenge.
4. To promote sustainability, the monitoring mechanism is required.

Conclusion

Each of the countries' water management programmes have their own niche and it has to be observed and embedded into Malaysian condition. Almost all water management programmes show the relationship between the communities and the government entities. The programmes also highlighted the empowerment of communities, and the people have experienced noticeably good results (ADB, 2012; SIWI, 2015; Josefsson, 2007).

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5.3 TOR Scope 3 (Study Potential of the Nation's Water Sector Industry Taking into Consideration Current Global Markets Towards Marketing the Water Sector as a Dynamic New Economic Sector Capable of Driving the Nation's GDP Growth in the Future)

This Scope is elaborated in Water as an Economic Sector (WES) (Volume IX).

5.4 TOR Scope 4 (Prepare a Transformation Strategy and Initiative Implementation Framework for each of the 4 Phases including the Implementation Agencies, Estimated Budgets and Main Target Achievements Based on the Analysis Undertaken and Expert Reviews)

Roadmap Framework already prepared and approved by both the Technical Committee and Steering Committee.

5.5 TOR Scope 5 (Undertake Consultations with Stakeholders and Experts with the Aim of Finalising the Proposed Strategies and Initiatives of the Nation's Water Sector Transformation)

5.5.1 Field Visit to Existing Training Centres

In order to propose a national IWRM training centre, AACB Sub-Sector had conducted a field visit to existing training facilities available in Malaysia. There are 27 potential training centres identified. A total of 23 potential training centres were visited in August 2020 to April 2021 as listed in **Table 5.9** below. During the visit, the training centres were evaluated using a checklist. However, due to Covid-19 with Movement Control Order restrictions, the field visit to other training centres, especially Sabah and Sarawak, cannot be conducted. Thus, AACB has conducted desktop studies and discussion with stakeholders through online engagements.

Table 5.9: Field visit to existing training centre

	Key Milestones	Dates
1	Field Visit to Institut Pembangunan Modal Insan (IPMI) Zon Utara JPS	23 July 2020
2	Field Visit to TNB - ILSAS - Malim Nawar	23 July 2020
3	Field Visit to INTAN Northern Regional Campus (INTURA)	16 August 2020
4	Field Visit to Lembaga Kemajuan Pertanian MADA	16 August 2020
5	Field Visit to Institut Latihan Perindustrian Kangar	17 August 2020
6	Field Visit to Pusat Inovasi dan Produktiviti Pentadbiran Awam (PIPPA), Universiti Sains Malaysia	18 August 2020
7	Field Visit to Universiti Sains Malaysia	18 August 2020
8	Field Visit to MPC Northern Region	18 August 2020
9	Field Visit to Institut Pembangunan Modal Insan (IPMI) JPS Zon Timur	25 August 2020
10	Field Visit to Institut Latihan FAMA Kota Bharu	25 August 2020

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	Key Milestones	Dates
11	Field Visit to Akademi Perikanan Malaysia	26 August 2020
12	Field Visit to Pusat Latihan & Pembangunan Pengembangan (Plpp), Wilayah Timur	26 August 2020
13	Field Visit to INTAN Eastern Regional Campus (INTIM)	2 September 2020
14	Field Visit to KEMAS Training Centre Malacca	25 August 2020
15	Field Visit to Perbadanan Kemajuan Negeri Melaka (MITC)	25 August 2020
16	Field Visit to Institut Latihan Perindustrian Pasir Gudang	26 August 2020
17	Field Visit to UTM TTC (Pusat Latihan UTM)	27 August 2020
18	Field Visit to Institut Latihan FAMA (ILFPD)	28 August 2020
19	Field Visit to Malaysian National Hydraulic Research Institute (NAHRIM)	4 September 2020
20	Field Visit to National Institute of Public Administration (INTAN)	4 September 2020
21	Field Visit to Institut Latihan KEMAS Kuantan (ILK)	1 September 2020
22	Field Visit to Pahang Skills Development Centre	1 September 2020
23	Field Visit to Pusat Informasi Sungai Penchala	13 April 2021



Figure 5.2: Field visit to existing training centre

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5.5.2 Stakeholders Engagement

The following are the activities that already been carried out by AACB Sub-Sector as shown in **Table 5.10**:

Table 5.10: AACB Sub-Sector Stakeholders Engagement

No	Stakeholders	Dates	Platforms
1.	Discussion with Kelab Alami, Gelang Patah-NGO	27 August 2020	Physical
2.	"Workshop Advocacy, Awareness Raising, Capacity Building & Public Participatory Platforms Sub-Sector Water Sector Transformation 2040 : Issues, Challenges and Opportunities"	8 October 2020	Hybrid (ASM/Zoom)
3.	Discussion with Water Warrior and UM Living Lab-NGO	15 December 2020	Online (Teams)
4.	Meeting with Global Environment Centre (GEC)-NGO	16 December 2020	Online (Teams)
5.	2nd Online Workshop on Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Sub-Sector (AACB Sub-Sector) – Module Development	8 January 2021	Online (Zoom)
6.	Webinar on "Training Module for Government Officials to Accelerate the Implementation of IWRM"	12 January 2021	Online (Zoom/ FB live)
7.	Discussion with Indah Green Waste Selangor-NGO	20 January 2021	Online (Teams)
8.	Webinar on Community-Led River Basin Management in Kedah	11 February 2021 FB live)	Online (Zoom/
9.	Discussion with Indah Water Academy	17 February 2021	Online (Teams)
10.	Webinar on Dynamic Leadership Roles of Government Sector for Water Resources Management at Davao, Philippines	23 February 2021	Online (Zoom/ FB live)
11.	Meeting with Malaysia Water Academy	26 February 2021	Online (Teams)
12.	Webinar on Safeguarding and Rehabilitating Malaysian Rivers Role and Responsibility of One and All	31 March 2021	Online (Zoom/ FB live)
13.	Discussion with Ministry of Education on AACB Academia Module Cluster 1. Research Sector and Policy Evaluation Education Programme Feasibility Unit 2. Education Policy Planning and Research Division Office (Policy) Policy Issues and Analysis Unit 3. Division of National STEM Centre Education Policy Planning and Research 4. Research and Development Unit Geography and Environmental Education Unit Curriculum Development Division (BPK)	2 April 2021	Online (Teams)
14.	Discussion with Ministry of Higher Education on AACB Academia Module Cluster 1. Division - Research and PPRN Section 2. Policy Planning and Research Division	3 April 2021	Online (Teams)

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No	Stakeholders	Dates	Platforms
15.	Discussion with Ministry of Higher Education on AACB Academia Module Cluster 1. Department of Higher Education 2. Research Excellence Division Institutes of Higher Learning Academic Excellence Division	3 April 2021	Online (Teams)
16.	Discussion with National Union of the Teaching Profession (NUTP) on AACB Academia Module Cluster	4 April 2021	Online (Teams)
17.	Webinar on The Paradigm Shift of Businesses and Industries towards Circularity in Water Management/Integrated Water Resource Management	24 February 2021	Online (Zoom/ FB live)
18.	Discussion with Global Environment Centre (GEC) RIVER Care Programme and River of Life POP at the River Education Centre and field visit to Pusat Informasi Sungai and Community	13 April 2021	Physical (Field Visit-Pusat Informasi sungai, Sungai Penchala)
19.	Webinar on Promoting Sustainable Water Resource Management in Universities	26 April 2021	Online (Zoom/ FB live)
20.	FOCUS GROUP DISCUSSION Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Sub-Sector (AACB Sub-Sector) with District Officers, Local Authorities and Chief Village of Muda River Basin, Petagas river and Baram River Basin.	4 May 2021	Online (Zoom)
21.	Workshop on validation of AACB modules	19 July 2021	Online (Zoom)
22.	AACB Community Module Validation Session <u>Global Environment Centre (GEC)</u> 1. Dr. Kalithasan 2. Sathis Venkitasamy 3. Jagesdewari <u>Water Warrior</u> 4. Dr. Zeeda Fatimah Mohamad 5. Affan Nasaruddin <u>WWF Malaysia</u> 6. Daria Mathew 7. Ching Hui Wong 8. Dhiya Shafiqah Ridzuan <u>Jabatan Pengairan dan Saliran (JPS)</u> 9. Asmadi Ahmad 10. Mohammad Hakim Hasnul	3 August 2021	Online (Google Meet)
23.	Meeting with Kementerian Alam Sekitar dan Air (KASA) - Water and Sewerage	23 September 2021	Online (Zoom)
24.	Pilot Study with Religious Leader and Community Leaders from Muda River Basin	30 September 2021	Online (Google Meet)

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a. Discussion with Public participatory Platform (NGOs)- AACB Sub-Sector visited and meeting with several active NGOs and platform that educate and advocate the local communities, especially the young generation. During the visit and meeting, the Sub-Sector discusses the challenge and recommendations from platforms.

i. Kelab Alami, Gelang Patah-NGO- on 27 August 2020, AACB Sub-Sector group visited Kelab Alami Gelang Patah,



Kelab Alami Tanjung Kupang

*Picture taken before MCO

ii. Discussion with Water Warrior and UM Living Lab-on 27 August 2020, AACB Sub-Sector meeting with Water Warrior and UM Living Lab on sustainability eco-campus initiative.



Water Warrior

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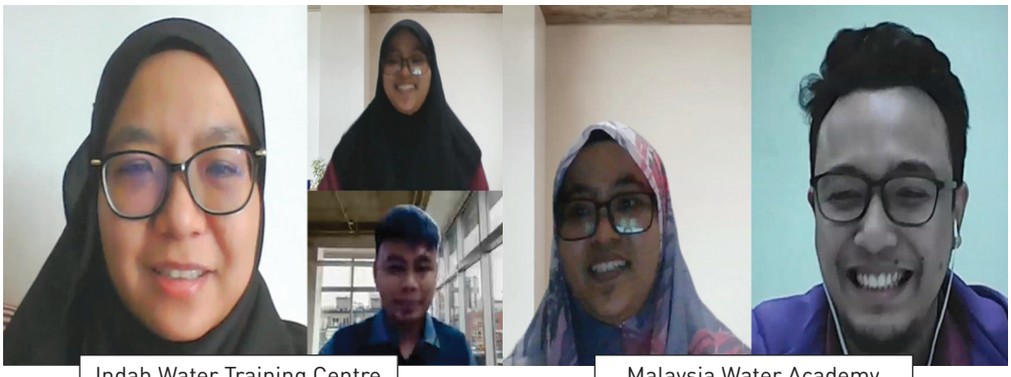
iii. Meeting with Global Environment Centre (GEC)-NGO- on 13 December 2020 and 13 May 2021, AACB Sub-Sector had discussion with GEC RIVER Care Programme and River of Life POP at the River Education Centre and field visit to Pusat Informasi Sungai and Community. The proposal of river care programme as attached in Appendix.



Global Environment Centre

iv. Discussion with Indah Green Waste Selangor-NGO-on 20 April 2021, the Sub-Sector discusses the challenge and recommendation from platforms on Waste recycling initiatives.

v. Discussion with existing water related training academy- AACB Sub-Sector conducted discussion with Indah water Training centre and Malaysia Water Academy discuss on the water related training and training centres.



Indah Water Training Centre

Malaysia Water Academy

b. "Workshop Advocacy, Awareness Raising, Capacity Building & Public Participatory Platforms Sub-Sector Water Sector Transformation 2040: Issues, Challenges and Opportunities" - A stakeholder engagement hybrid workshop has been conducted which held on 8th October 2020 (Thursday) with the theme "1st Workshop Advocacy, Awareness Raising, Capacity Building & Public Participatory Platforms: Issues, Challenges and Opportunities". A total of 32 participants were attended. AACB and PPPs initiatives were proposed by stakeholders such as:

i. Open classroom concept for community engagement.
ii. Strengthen academia role through capacity development for academia.
iii. TVET programmes.
iv. Ecosystem Value Services.
v. Community empowerment for PPP.

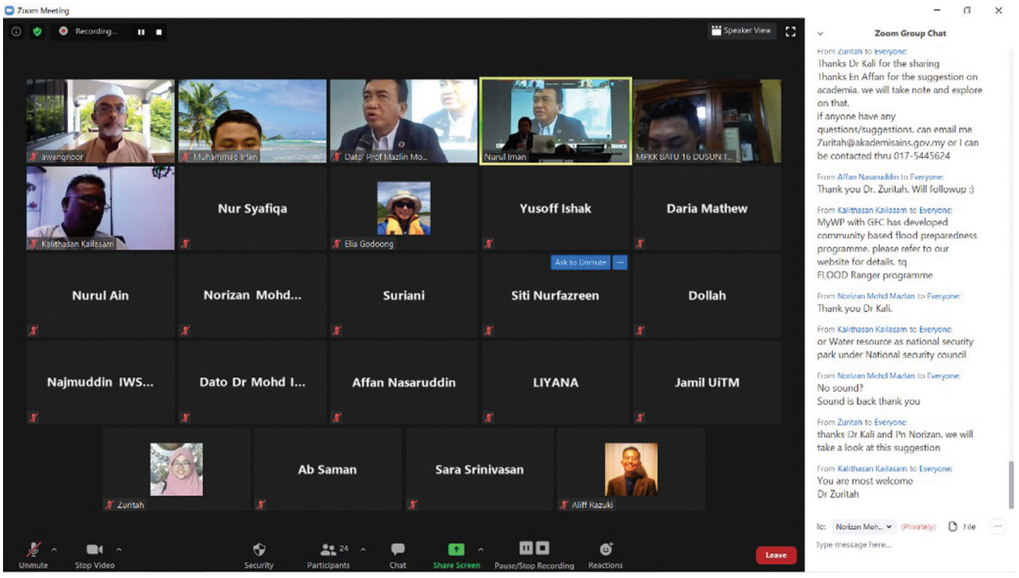
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vi. Empowerment of local government.

vii. Suggestion of Sungai Petagas as Pilot study case in Sabah.

viii. Enhance and monitoring of competency module training for business industry.

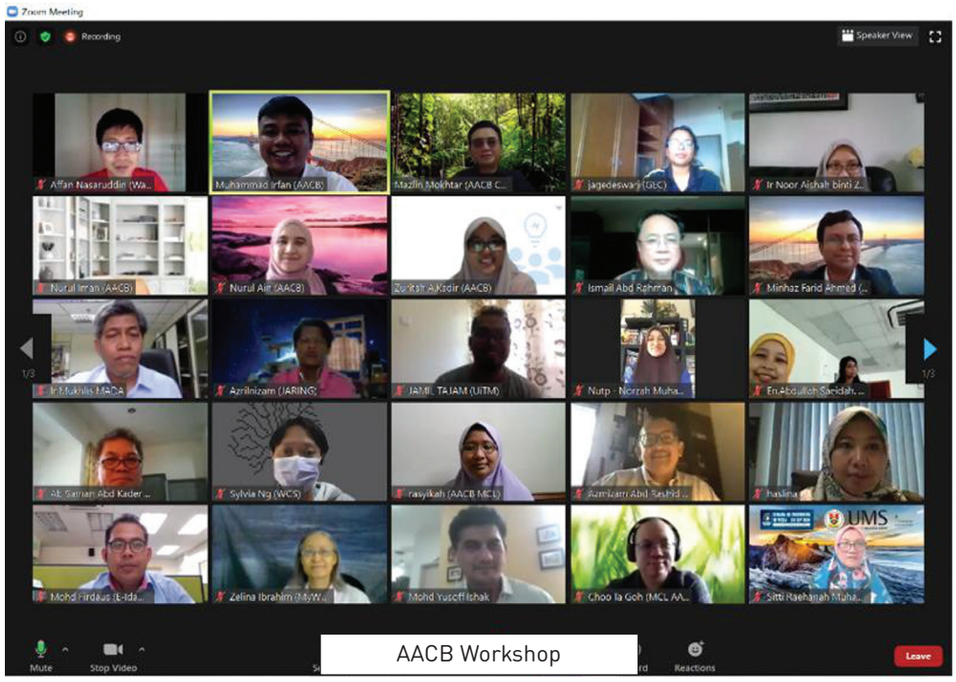
ix. River Basin Network/River Basin Organisation approach.





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c. 2nd Online Workshop on Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Sub-Sector (AACB Sub-Sector) – Module Development was conducted on 8 January 2021 with total participants of 82 people from various stakeholders. In the workshop, AACB module cluster leaders presented the table of content of AACB modules to obtain the feedback and recommendations on module development. The feedback and recommendation are very important to ensure that the module meet the stakeholder's requirements.



AACB Workshop

d. Webinar series

With regards to Covid-19 pandemic situation, AACB Sub-Sector has undertaken six series of webinars. AACB Sub-Sector invited experienced water experts from both locally and internationally. Video of webinar can be watched through Academy Science Malaysia Facebook Page (https://www.facebook.com/akademisainsmy/)

i. Webinar Series 1 : Webinar on "Training Module for Government Officials to Accelerate the Implementation of IWRM".
Facebook Link : https://www.facebook.com/akademisainsmy/videos/1021178521703292



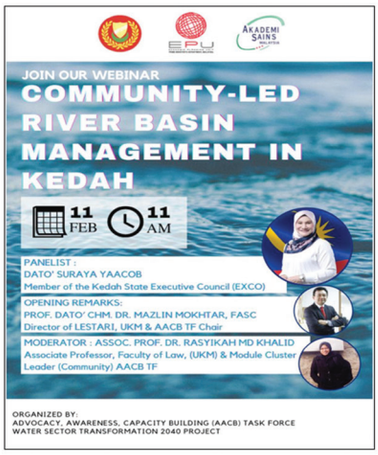
Panel: **YBhg Dato' Ir Hj Hanapi Bin Mohamad Noor**
Former JPS Deputy Director General

Reach - 3,131
FB Views -1k
Engagements - 205
Zoom Participants - 66



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ii. Webinar Series 2 : Webinar on Community-Led River Basin Management in Kedah
Facebook Link : https://www.facebook.com/akademisainsmy/videos/3869697299718456



Panel: **YB Dato'Suraya Yaaçob**
Member of the Kedah State Executive Council (EXCO)

Reach - 2,341
FB Views -1.8k
Engagements - 323
Zoom Participants – 66

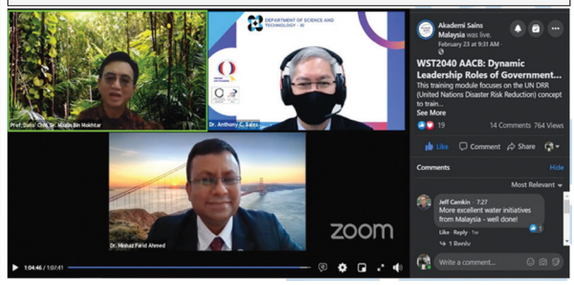


iii. Webinar Series 3 : Webinar on Dynamic Leadership Roles of Government Sector for Water Resources Management at Davao, Philippines
Facebook Link : https://www.facebook.com/akademisainsmy/videos/893959151337559



Panel: **Dr Anthony Sales**
Director of the Department of Science & Technology, Philippines

Reach - 728
FB Views – 762
Engagements - 154
Zoom Participants – 66



iv. Webinar Series 4: Webinar on The Paradigm Shift of Businesses and Industries towards Circularity in Water Management/Integrated Water Resource Management
Facebook Link : https://www.facebook.com/akademisainsmy/videos/249669233322088



Panel: 1.**Y.Bhg. Dato' Teo Yen Hua**
Former CEO of SPAN, Independent Director of Pengurusan Air Selangor Sdn Bhd and Advisor for Water Series, Informa Markets (Malaysia)
2.**Ybrs. IR Ellias Saidin**
Deputy President of SPAH

Reach - 1,339
FB Views - 517
Engagements - 154
Zoom Participants – 61



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v. Webinar Series 5 : Webinar on Safeguarding and Rehabilitating Malaysian Rivers Role and Responsibility of One and All
Facebook Link : https://www.facebook.com/akademisainsmy/videos/320874799664881



Panel:
Dr. Norhazni binti Mat Sari, Deputy Director General of Department of Environment (DOE)

Reach -1,655
FB Views – 1.2K
Engagements - 154
Zoom Participants – 102

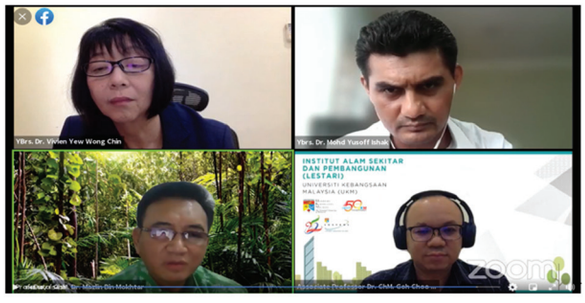


vi. Webinar Series 6 : Webinar on Promoting Sustainable Water Resource Management in Universities
Facebook link : https://www.facebook.com/akademisainsmy/videos/507962810387410



Panel:
1. Dr. Vivien Yew Wong Chin
Senior Lecturer of Faculty of Social Sciences and Humanities, UKM
2. Dr. Mohd Yusoff Ishak, Lecturer of Faculty of Forestry and Environment, UPM.

Reach - 1,340
FB Views - 475
Engagements - 154
Zoom Participants – 102



e. Government Cluster Focus Group Discussion - The purpose of the engagement was to get feedbacks and recommendation from Government stakeholders on Roadmap strategies and Government training module.

i. AACB on-going programmes and initiative from several government agencies such as Department of Irrigation and Drainage (DID), Department of Environment (DOE), Suruhanjaya Perkhidmatan Air Negara (SPAN), and National Hydraulic Research Institute of Malaysia (NAHRIM).

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ii. Written Interview feedbacks from Lembaga Urus Air Selangor and Malaysia Water Partnership.
iii. Discussion with Kementerian Tenaga dan Sumber Asli (KeTSA) on 6 April 2021 with several representative from Strategic and International Planning Division and Renewable Energy Division.
iv. Discussion with Director General of Department of Irrigation and Drainage (DID), Director General of Department of Irrigation and Drainage on 26 March 2021.
v. Focus Group Discussion Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Sub-Sector (AACB Sub-Sector) with District Officers, Local Authorities and Chief Village of Muda River Basin, Petagas river, and Baram River Basin was conducted on 4 May 2021.

f. Academia Cluster Focus Group Discussion- The purpose of the engagement was to get feedbacks and recommendation from Academia stakeholders on Roadmap strategies and Academia training module.

i. Discussion with Ministry of Education on AACB Academia Module Cluster was conducted on 2 April 2021 with representative from Research Sector and Policy Evaluation Education Programme Feasibility Unit, Education Policy Planning and Research Division Office (Policy) Policy Issues and Analysis Unit, Division of National STEM Centre Education Policy Planning and Research, Research and Development Unit Geography, and Environmental Education Unit Curriculum Development Division (BPK).
ii. Discussion with Ministry of Higher Education on AACB Academia Module Cluster was conducted on 3 April 2021 with representative from Division - Research and PPRN Section, Policy Planning and Research Division.
iii. Discussion with Ministry of Higher Education on AACB Academia Module Cluster on 3 April 2021 with Department of Higher Education, Research Excellence Division Institutes of Higher Learning and Academic Excellence Division.
v. Discussion with National Union of the Teaching Profession (NUTP) was conducted on 4 April 2021.

5.6 TOR Scope 6 (Prepare a Complete Roadmap for the National Agenda on the Water Sector Transformation 2040 for the various Ministries and Agencies' Information and Guide for the Implementation of Programmes and Activities towards Achieving the Targeted Transformation Objectives)

As per TOR Scope 4 above, the Roadmap Framework has been prepared. The relevant Focus Areas will be populated by AACB Sub-Sector for all the 4 Phases.

Roadmap Water for Resources as tabulated in **Table 5.11** below:

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Table 5.11: WST2040 Strategy Plan and Implementation Road Map

WST2040 Strategy Plan and Implementation Road Map										
	Water as a Resource/Water Security and Sustainability									
	11MP/12MP/13MP/14MP/15MP									
	Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**	
People	1. Institutionalisation of public participatory platform (PPP) for the effective decision-making processes of IWRM	1.1 To enhance participation of civil servants in PPPs in order to ease decision making for IWRM via AACB training programme	1.1.8 National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum	National	National	KASA/JPA	JPA	12MP and Beyond		People
	2. Reiterate importance of rivers as water resources for hum and the environment	2.1 To train & retrain teachers on topics that are related to water resource management	2.1.1 Training & retraining teachers on topics that are related to water resource management	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia	
			2.1.2 Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teacher professional development for in-service teachers based on the guidebook or teacher's professional development module on water sustainability by ASM.							
			2.1.3 Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond	Train 140 trainers	

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WST2040 Strategy Plan and Implementation Road Map								
Water as a Resource/Water Security and Sustainability								
11MP/12MP/13MP/14MP/15MP								
Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**
	2.2 To train & retrain teachers on topics that are related to climate change education	2.1.4 Professional development programme to familiarise teachers with climate science, active pedagogy and project design.	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond	Train 23,360 teachers
		2.1.5 BPG - Planning and conducting structured teacher's professional development for in-service teachers based on the teaching module on climate education.						
		2.1.6 IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i) Training of Trainers ii) Teachers' Training						Train 80 trainers
3. Inculcation of local values	3.1 To train & retrain teachers on activities that are related to water resource management.	3.1.1 Training & retraining teachers on activities that are related to water resource management.	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia
		3.1.2 BPG - Planning and conducting structured teacher professional development for in-service teachers based on the guidebook or teaching module by ASM.						

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WST2040 Strategy Plan and Implementation Road Map

Water as a Resource/Water Security and Sustainability

11MP/12MP/13MP/14MP/15MP

Strategy	Programmes/ Initiatives	Activities	Hierarchical Level	Lead Authority/ Collaborating Partners	Implementing Authority	Current Status	Target Completion	Remarks
		3.1.3 IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training						
4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 To train lecturers on topics and activities that are related to water resource management.	4.1.1 Training lecturers on topics and activities that are related to water resource management.	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond	The WST2040 should cover 50% of the total lecturers (50,085 that includes professor, associate professor and lecturers) in Malaysia
5. Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders	5.1 To train representative from each businesses and industries on IWRM and water resource management by providing AACB integrated training modules.	5.1.1 AACB "Training of Trainers"	National	KASA	KASA	New	12MP and Beyond	
6. Provide competency certification for business and industry stakeholders who have undergone the training	6.1 Giving competency certification for EHS and Sustainability Professionals of business and industry.	6.1.1 Water management certificate	National	KASA	EiMAS	New	12MP and Beyond	

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WST2040 Strategy Plan and Implementation Road Map								
Water as a Resource/Water Security and Sustainability								
11MP/12MP/13MP/14MP/15MP								
Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**
7. Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc)	7.1 Giving CPD point to all staff and officer that attend business and industry module training.	7.1.1 CPD for water management	National	MOHR	HRDF	New	12MP and Beyond	
8. Increasing community awareness and instil ownership towards rivers and other water sources in their river basin.	8.1 To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	8.1.1 AACB Community Module Training Programme	National & State	KASA & State BKSA	KASA & State BKSA	New	12MP and Beyond	
9. National Communication Plan	9.1 To expand the implementation of public outreach programme and participation	9.1.1 Form National Communication team	National	KASA	KASA & NWC	New	12MP	
10. To establish and encourage the water related PPPs	10.1 National Water Resource Grant	10.1.1 National water grant programme	National	KASA	KASA	New	12MP and Beyond	Community-based organisations (CBOs) such as Resident Associations, JKKK and Rukun Tetangga; Non-profit organisations, learning institutions and special interest groups who has interest in the management of their river basins and academia.

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WST2040 Strategy Plan and Implementation Road Map

Water as a Resource/Water Security and Sustainability

11MP/12MP/13MP/14MP/15MP

	Strategy	Programmes/ Initiatives	Activities	Hierarchical Level	Lead Authority/ Collaborating Partners	Implementing Authority	Current Status	Target Completion	Remarks	
Governance	1. Training module to enhance leadership roles of civil servants in order to facilitate the enforcement of policies and laws for better water governance.	1.1 To enhance enforcement capacity of civil servants via AACB training programme.	1.1.1 Trainee (RM) 1.1.2 Trainer (RM) 1.1.3 Events/logistic (RM) 1.1.4 Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/training x 2 pax. X 16 states)	National	KASA/KPKT/ MOH	MSANg/JPS/ JAS/PBT/DO	New	12 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.	Governance
	2. Reiterate importance of rivers as water resources for human and the environment	2.1 Develop a guidebook on water sustainability climate change adaptation that could be used by teachers in Malaysia.	2.1.1 Develop teacher's professional development workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation.	National	KASA	Ministry of Education (MOE)	New	12MP		
			2.1.2 Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teacher's professional development.		KASA					
			2.1.3 Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP)		KASA	Ministry of Education (MOE) & Ministry of Higher Education (MOHE)				

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WST2040 Strategy Plan and Implementation Road Map								
Water as a Resource/Water Security and Sustainability								
11MP/12MP/13MP/14MP/15MP								
Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**
		2.1.4 Incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers.		KASA	Lead Authority (MOE)			
3. Inculcation of local values	3.1 Compile case studies of best practices of river/ water management and climate adaptation	3.1.1 Compile local and international case studies on the best practices of river/water management and climate change adaptation.	National	KASA	Ministry of Education (MOE)	New	12MP	Establish a committee to compile local and international case studies on the best practices of river/ water management
		3.1.2 Strengthen collaboration and cooperation between TVET and industry, where more sessions or platforms for industry to share their experiences and expectations with the TVET students will be established		KASA	Ministry of Education (MOE)			
4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 compile success stories related to water resources management in HEIs (public and private) and share it throughout Malaysia.	4.1.1 To compile success stories related to water resources management in HEIs (public and private)	National	KASA	Ministry of Higher Education (MOHE)	New	12MP	Establish a committee to compile success stories related to water resources management in HEIs and (public private)

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WST2040 Strategy Plan and Implementation Road Map

	Water as a Resource/Water Security and Sustainability									
	11MP/12MP/13MP/14MP/15MP									
	Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**	
	5. Government to form strategic partnership with business and industry and establish resource person directory within their regional network	5.1 To form strategic partnership with business and industry	5.1.1 Water resource person network and directory	National	KASA	DOE	New	12MP and Beyond	Resource persons are appointed from those competent trainers upon attending business and industry module training for their respective zone and region. A directory of resource person is available for public access.	
	6. Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin.	6.1 To establish a formal platform/ state IWRM Training Centre.	6.1.1 AACB Community Module Training Programme	National & State	KASA & State BKSA	KASA & State BKSA	New	12MP and Beyond		
Information & RDCI	1. Integrated and comprehensive data sharing and management	1.1 To ensure flow of reliable data and information from relevant agencies to the local government for IWRM.	1.1.1 Digitalisation of WST2040 AACB training module (Lump sum)	National	KASA/KPKT/ MOH	MSANg/JPS/ JAS/PBT/DO	New	13 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.	Information & RDCI
			1.1.2 GIS based pollution sources mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)	National	KASA/KPKT/ MOH	MSANg/JPS/ JAS/PBT/DO	New	12 MP and Beyond		

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WST2040 Strategy Plan and Implementation Road Map								
Water as a Resource/Water Security and Sustainability								
11MP/12MP/13MP/14MP/15MP								
Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**
2. Reiterate importance of rivers as water resources for human and the environment	Establish an information that focussing on water that will assist students and teachers information sheets that could enhance awareness amongst the students on the importance of sustainable water resource management and climate change	2.1.1 Develop a water and climate literacies assessment instrument	National	KASA	Ministry of Higher Education (MOHE)	New	12MP	
		2.1.2 Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	National	KASA	Ministry of Education (MOE) & Ministry of Higher Education (MOHE)	New	12 MP and Beyond	The WST2040 should cover 50% of the total schools (16,440) in Malaysia
3. Inculcation of local values		3.1.1 Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond	The WST2040 should cover 50% of the total schools (16,440) in Malaysia
4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity		4.1.1 To establish a database of resource persons (from public and private HEIs) in the field of water resource management.	National	KASA	Education (MOE)	New	12MP and Beyond	The database is made available online.
		4.1.2 To mainstream water resource management as one of the priority research areas in RDCI	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond	The funding will be provided by Government.
		4.1.3 Researchers' outreach programme to government agencies.	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond	The funding will be provided by Government.

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WST2040 Strategy Plan and Implementation Road Map

	Water as a Resource/Water Security and Sustainability									
	11MP/12MP/13MP/14MP/15MP									
	Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**	
			4.1.4 Researchers' outreach programme to industry.	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond	The funding will be provided by Government.	
			4.1.5 Researchers' outreach programme to community.	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond	The funding will be provided by Government.	
	5. Resource person to publish and disseminate water best management practices in business and industry through public communication means		5.1.1 Water best management practices communication	National	KASA	DOE	New	12MP and Beyond	Interactive public communication for water best management practices.	
	6. Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin.	6.1 To provide informative and compact data on water management that can be understood by general public at the religion and community centre and near their river.	6.1.1 AACB Information Corner	National & State	KASA & State BKSA	State BKSA	New	12MP and Beyond		
			6.1.2 Notice Board by The River	National & State	KASA & State BKSA (with the support of KPLB& KPKT)	KASA & State BKSA (with the support of KPLB & KPKT)	New	12MP and Beyond		
Infrastructure & Technology	1. IWRM training centres such as Pusat Informasi Sungai an other should have adequate online/on-site facilities considering the uncertainties.	1.1 To advocate IWRM by the civil servants via ToT using AACB training programme.	1.1.1 Developing a portal and digital AACB content such as video clips, posters, infographics and podcasts for 154 Local Authorities (LS RM750,000)	National	KASA/KPKT/ MOH	MSANg/JPS/ JAS/PBT/DO	New	12 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.	Infrastructure & Technology
			1.1.2 Establishment of WST2040 AACB Water Hub in 13 States and 3 F.T. for public							

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WST2040 Strategy Plan and Implementation Road Map								
Water as a Resource/Water Security and Sustainability								
11MP/12MP/13MP/14MP/15MP								
Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**
		participatory and effective decision-making processes of IWRM. (Lump sum RM15,000 x 16 units)						
		1.1.3 400 Training Events in every year (1 training = 4 days) (Lump Sum) (25 training/ year/state (i.e. 16 states))						
		1.1.4 1 Coordinator for IWRM Training with an FASc based at LESTARI, UKM (Lump sum RM15,000/pax/month)						
		1.1.5 5 Assistants to facilitate IWRM Training based at LESTARI, UKM (Lump sum RM5,000/pax/month)						
		1.1.6 Honorarium for Resource Person to facilitate IWRM Training (Lump sum RM10,000/pax/training x 1,567 pax)						
2. Reiterate importance of rivers as water resources for human and the environment	2.1 online education tools	2.1.1 Expand digital platforms/tools for teaching and learning 2.1.2 Develop simulation-based games, mobile platforms, virtual environments, and augmented reality tools to heighten curiosity and increase learner engagement.	National	KASA	Ministry of Education (MOE)	New	12MP	The online education tools should be developed by the ministry.

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WST2040 Strategy Plan and Implementation Road Map

Water as a Resource/Water Security and Sustainability

11MP/12MP/13MP/14MP/15MP

Strategy	Programmes/ Initiatives	Activities	Hierarchical Level	Lead Authority/ Collaborating Partners	Implementing Authority	Current Status	Target Completion	Remarks
		2.1.3 Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively.	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond	Involving 2,445 secondary schools
		2.1.4 Establish one-stop educational resources and activities on water and climate change in Digital Educational Learning Initiatives Malaysia (DELIMa) platform.	National	KASA	Ministry of Education (MOE)	New	12MP	All schools can access the educational resources and activities in DELIMa.
3. Inculcation of local values	3.1 showcase the project-based learning (PBL)	3.1.1 Establish a single, searchable, user-friendly online resource for finding water- and climate-related education programmes and resources and funding opportunities as well as to showcase the project-based learning (PBL) activities that were conducted by schools (using a new or enhanced platform).	National	KASA	Ministry of Education (MOE)	New	12MP	
4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 encourage interactive communication between HEIs (public and private) and public	4.1.1 To establish an interactive tool that encourage interactive communication between HEIs (public and private) and public	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond	The interactive tool can be used in different platforms, such as Windows, Mac, Android, iOS, etc.

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WST2040 Strategy Plan and Implementation Road Map									
	Water as a Resource/Water Security and Sustainability								
	11MP/12MP/13MP/14MP/15MP								
	Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**	
	5. One-stop Training Centres at national and state	5.1 Water One-Stop Training Centre	5.1.1 Establish Water One-Stop Training Centre	National	KASA	DID	New	12MP and Beyond	Using existing training centres for business and industry module training.	
	6. Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction.	6.1 To develop and establish an Apps to share/link data needed for the community to decide on river basin.	6.1.1 Myriverbasin Apps	National	KASA & State BKSA	KASA & State BKSA	New	12MP and Beyond		
Finance	1. Adequate funds for non-structural capacity building towards IWRM.	1.1 To implement comprehensive AACB programme at the PPPs.	1.1.1 Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/training x 232000 units)	National	KASA/KPKT/ MOH	MSANg/JPS/ JAS/PBT/DO	New	12 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.	
	2. Reiterate importance of rivers as water resources for human and the environment	2.1 Adequate fund and finance	2.1.1 All the activities proposed above required financial support from the government.	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond		
	3. Inculcation of local values	3.1 Adequate fund and finance	3.1.1 All the activities proposed above required financial support from the government.	National	KASA	Ministry of Education (MOE)	New	12MP and Beyond		
	4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 Adequate fund and finance	4.1.1 All the activities proposed above required financial support from the government.	National	KASA	Ministry of Higher Education (MOHE)	New	12MP and Beyond		Finance

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WST2040 Strategy Plan and Implementation Road Map								
Water as a Resource/Water Security and Sustainability								
11MP/12MP/13MP/14MP/15MP								
Strategy	**Programmes/ Initiatives**	**Activities**	**Hierarchical Level**	**Lead Authority/ Collaborating Partners**	**Implementing Authority**	**Current Status**	**Target Completion**	**Remarks**
5. Introduce new category in Green Incentives that is related to water management project	5.1 Promoting more business and industry to adopt and implement water management project in their premises.	5.1.1 Water incentives	National	MIDA	MIDA	New	12MP and Beyond	
6. Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody	6.1 Giving tax exemption to business and industry for their contribution in conserving water body near their premises.	6.1.1 Company tax exemption	National	MOF	LHDN	New	12MP and Beyond	
7. Give awards and recognitions to business and industry that succeed in applying best management practices in their premises	7.1 Giving annual award and recognition as a publicity for business and industry to improve their sustainability image.	7.1.1 Water Sustainability Award	National	KASA	KASA	New	12MP and Beyond	
8. Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction.	8.1 To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	8.1.1 To incorporate IWRM/ IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	National	MSAN	MSAN	New	12MP and Beyond	

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The Budget for each strategies of each of Malaysian Plan Phase (12th,13th, 14th, & 15th) were tabulated in **Table 5.12** below:

Table 5.12: WST2040 Budget Requirements

WST2040 Budget Requirements																
Focus area	Water as a Resource/Water Security and Sustainability															Focus area
	Strategy	Programmes/ Initiatives	Activities	Lead Ministry/ Organisation	Budget (RM '000,000)									Target Completion	Remarks	
					2021	2022	2023	2024	2025	Total 12MP	13MP	14MP	15MP			
People	1. Institutionalisation of public participatory platform (PPP) for the effective decision-making processes of IWRM training	1.1 To enhance participation of civil servants in PPPs in order to ease decision making for IWRM via AACB curriculum programme	1.1.8 National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum	KASA/JPA	-	3.6	3.6	3.6	3.6	14.4	18.0	18.0	18.0	12MP and Beyond	Inter-Ministerial as well as line agencies Consortium to undertake appropriate measures for the participation of civil servants in PPPs	People
	2. Reiterate importance of rivers as water resources for human and the environment	2.1 To train & retrain teachers on topics that are related to water resource management	2.1.1 Training & retraining teachers on topics that are related to water resource management	KASA	-	0.22	0.22	0.22	0.22	0.88	2.12	3.13	4.3	12MP and Beyond	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia	
			2.1.2 Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teacher's professional development for in-service teachers based on the guidebook or teacher's professional development module on water sustainability by ASM.													
			2.1.3 Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	-	-	-	-	-	0.01	0.01	0.01	0.01	12MP and Beyond	Train 140 trainers	

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability														Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
		2.2 To train & retrain teachers on topics that are related to climate change education	2.2.1 Professional development program to familiarise teachers with climate science, active pedagogy and project design.	KASA	-	0.07	0.07	0.07	0.07	0.28	0.35	0.35	0.35	12MP and Beyond	Train 23,360 teachers	
			2.2.2 BPG - Planning and conducting structured teacher's professional development for in-service teachers based on the teaching module on climate education.													
			2.2.3 IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training		-	-	-	-	-	0.01	0.01	0.01	0.01	12MP and Beyond	Train 80 trainers	
	3. Inculcation of local values	3.1 To train & retrain teachers on activities that are related to water resource management.	3.1.1 Training & retraining teachers on activities that are related to water resource management.	KASA	-	0.22	0.22	0.22	0.22	0.88	2.12	3.13	4.3	12MP and Beyond	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia	
			3.1.2 BPG - Planning and conducting structured teacher's professional development for in-service teachers based on the guidebook or teaching module by ASM.													
			3.1.3 IPGM - The training will be implemented in													

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability															Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
			various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training													
	4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 To train lecturers on topics and activities that are related to water resource management.	4.1.1 Training lecturers on topics and activities that are related to water resource management.	KASA	-	0.51	0.51	0.51	0.51	2.04	0.51	0.74	1.02	12MP and Beyond	The WST2040 should cover 50% of the total lecturers (50,085 that includes professor, associate professor, and lecturers) in Malaysia	
	5. Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders	5.1 To train representative from each businesses and industries on IWRM and water resource management by providing AACB integrated training modules.	5.1.1 AACB "Training of Trainers"	KASA (DOE)	-	0.3	0.3	0.3	0.3	1.2	1.2	1.2	1.2	12MP and Beyond	Setting up One-stop Training Centres at national and state levels, providing AACB integrated training modules. (per pax: RM968.90)	
	6. Provide competency certification for business and industry stakeholders who have undergone the training	6.1 Giving competency certification for EHS and Sustainability Professionals of business and industry.	6.1.1 Water management certificate	KASA (EiMAS)	-	0.15	0.15	0.15	0.15	6	7.5	7.5	7.5	12MP and Beyond	Giving competency certification for EHS and Sustainability Professionals of business and industry.	
	7. Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc)	7.1 Giving CPD point to all staff and officer that attend business and industry module training.	7.1.1 CPD for water management	MOHR	-	0.12	0.12	0.12	0.12	4.8	0.6	0.6	0.6	12MP and Beyond	Giving CPD point to all staff and officer that attend business and industry module training. RM120,000 for management fees)	

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability														Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
	8. Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin.	8.1 To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	8.1.1 AACB Community Module Training Programme	KASA & State BKSA	-	2.55	2.55	2.55	0.02	7.67	15.30	30.60	61.2	12MP and Beyond	12MP: 1,500 pax 15 River Basin, 3 River Basin per Region, 100 advocators in each River Basin. 3 Levels 2022: BEGINNERS (RM2,550,000) 2023: INTERMEDIATE (RM2,550,000) 2024: ADVANCED (RM2,550,000) 2025: MODULES UPDATE/REVISE	
	9. National Communication Plan	9.1 To expand the implementation of public outreach programme and participation	9.1.1 Form National Communication team	KASA	-	1.0	-	-	-	1.0	-	-	-	12MP	To be developed in 12MP	
	10. To establish and encourage the water related PPPs	10.1 National Water Resource Grant	10.1.1 National water grant programme	KASA	-	1.0	1.0	1.0	1.0	4.0	5.0	5.0	5.0	12 MP and Beyond		
Governance	1. Training module to enhance leadership roles of civil servants in order to facilitate the enforcement of policies and laws for better water governance.	1.1 To enhance enforcement capacity of civil servants via AACB training programme.	1.1.1 Trainee (RM)	KASA	-	3.83	40.73	407.03	4029.53	4481.10	1426.42	1426.42	1426.42	12 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.	Governance
			1.1.2 Trainer (RM)		-	1.02	5.40	54.24	542.64	603.30	190.19	190.19	190.19			
			1.1.3 Events/logistic (RM)		-	6.94	73.49	738.21	7385.33	8203.97	2588.47	2588.47	2588.47			
			1.1.4 Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/ training x 2 pax. X 16 states)		-	-	0.96	0.96	0.96	2.88	0.000005	0.000005	0.000005			
	2. Reiterate importance of rivers as water	2.1 Develop a guidebook on water	2.1.1 Develop teacher's professional development	KASA	-	0.01	0.01	-	-	0.02	-	-	-	12MP		

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability														Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
	resources for human and the environment	sustainability climate change adaptation that could be used by teachers in Malaysia.	workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation.													
			2.1.2 Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teacher's professional development.	KASA	-	0.01	0.01	-	-	0.02	-	-	-	12MP		
			2.1.3 Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP)	KASA	-	0.01	0.01	-	-	0.02	-	-	-	12MP		
			2.1.4 Incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers	KASA	-	0.25	0.25	0.25	0.25	1	-	-	-	12MP		
	3. Inculcation of local values	3.1 Compile case studies of best practices of river/water management and climate adaptation	3.1.1 Compile local and international case studies on the best practices of river/water management and climate change adaptation.	KASA	-	0.01	0.01	-	-	0.02	-	-	-	12MP	Establish a committee to compile local and international case studies on the best practises of river/water management	
			3.1.2 Strengthen collaboration and	KASA	-	0.25	0.25	0.25	0.25	1	-	-	-	12MP		

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability															Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
			cooperation between TVET and industry, where more sessions or platforms for industry to share their experiences and expectations with the TVET students will be established													
	4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 Compiling success stories related to water resources management in HEIs (public and private)	4.1.1 To compile success stories related to water resources management in HEIs (public and private)	KASA	-	0.01	0.01	-	-	0.02	-	-	-	12MP	Establish a committee to compile success stories related to water resources management in HEIs (public and private)	
	5.Government to form strategic partnership with business and industry and establish resource person directory within their regional network	5.1 To form strategic partnership with business and industry	5.1.1 Water resource person network and directory	KASA	-	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	12MP and Beyond	Resource persons are appointed from those competent trainers upon attending business and industry module training for their respective zone and region. A directory of resource person is available for public access. (100K (event/meeting))	
	6. Increasing community awareness and instil ownership towards rivers and other water sources in their river basin.	6.1 To establish a formal platform/state IWRM Training Centre.	6.1.1 AACB Community Module Training Programme	KASA & State BKSA	-	-	-	-	-	-	-	-	-	12MP		
Information & RDCI	1. Integrated and comprehensive data sharing and management	1.1 To ensure flow of reliable data and information from relevant agencies to the local government for IWRM.	1.1.1 Digitalisation of WST2040 AACB training module (Lump sum)	KASA/KPKT/ MOH	-	-	-	-	-	-	0.05	0.05	0.05	13 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.	Information & RDCI

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability															Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
			1.1.2 GIS based pollution sources mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)		-	7.7	3.08	3.08	3.08	16.94	15.4	15.4	15.4	12MP and Beyond		
	2. Reiterate importance of rivers as water resources for human and the environment	2.1 Establish an information that focussing on water that will assist students and teachers' information sheets that could enhance awareness amongst the students on the importance of sustainable water resource management and climate change	2.1.1 Develop a water and climate literacies assessment instrument	KASA	-	0.01	0.01	-	-	0.02	-	-	-	12MP		
			2.1.2 Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	KASA	-	0.17	0.17	0.17	0.17	0.68	0.17	0.2	0.33	12MP and Beyond	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	
	3. Inculcation of local values		3.1.1 Federal and state/ local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	Lead Authority KASA	-	0.17	0.17	0.17	0.17	0.68	0.17	0.25	0.33	12MP and Beyond	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	
	4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity		4.1.1 To establish a database of resource persons (from public and private HEIs) in the field of water resource management.	KASA	-	0.01	0.01	0.02	-	0.05	-	-	-	12MP	The database is made available online.	

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability														Focus area
	Strategy	Programmes/ Initiatives	Activities	Lead Ministry/ Organisation	Budget (RM '000,000)									Target Completion	Remarks	
					2021	2022	2023	2024	2025	Total 12MP	13MP	14MP	15MP			
			4.1.2 To mainstream water resource management as one of the priority research areas in RDCI	KASA	-	5.0	5.0	5.0	5.0	20.0	20.0	20.0	20.0	12MP and Beyond	The funding will be provided by Government	
			4.1.3 Researchers' outreach programme to government agencies.	KASA	-	1.0	1.0	1.0	1.0	4.0	5.0	5.0	5.0	12MP and Beyond	The funding will be provided by Government	
			4.1.4 Researchers' outreach programme to industry.	KASA	-	1.0	1.0	1.0	1.0	4.0	5.0	5.0	5.0	12MP and Beyond	The funding will be provided by Government	
			4.1.5 Researchers' outreach programme to community.	KASA	-	1.0	1.0	1.0	1.0	4.0	5.0	5.0	5.0	12MP and Beyond	The funding will be provided by Government	
	5. Resource person to publish and disseminate water best management practices in business and industry through public communication means		5.1.1 Water best management practices communication	KASA	-	0.125	0.125	0.125	0.125	0.5	0.5	0.5	0.5	12MP and Beyond	Interactive public communication for water best management practices. 100K (event/meeting)	
	6. Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin.	6.1 To provide informative and compact data on water management that can be understood by general public at the religion and community centre and near their river.	6.1.1 AACB Information Corner	KASA & State BKSA	-	0.01	0.01	0.01	0.01	0.04	0.10	0.15	0.20	12MP and Beyond	12MP: 400 centres 13MP: 1,000 centres 14MP: 1,500 centres 15MP: 2,000 centres (RM100 per centre)	
			6.1.2 Notice Board by The River	KASA & State BKSA (with the support of KPLB & KPKT)	-	0.05	0.05	0.05	0.05	0.20	0.50	0.75	1.00	12MP and Beyond	12MP: 400 rivers 13MP: 1,000 rivers	

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability															Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
															14MP: 1,500 rivers 15MP: 2,000 rivers (RM500 per river)	
Infrastructure & Technology	1. IWRM training centres such as Pusat Informasi Sungai and other should have adequate online/on-site facilities considering the uncertainties.	1.1 To advocate IWRM by the civil servants via ToT using AACB training programme.	1.1.1 Developing a portal and digital AACB content such as video clips, posters, infographics and podcasts for 154 Local Authorities (LS RM750,000)	KASA/KPKT/ MOH	-	0.75	0.75	0.75	0.75	3.00	3.00	3.00	3.00	12MP and Beyond	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.	Infrastructure & Technology
			1.1.2 Establishment of WST2040 AACB Water Hub in 13 States and 3 F.T. for public participatory and effective decision-making processes of IWRM. (Lump sum RM15,000 x 16 units)		-	0.06	0.06	0.06	0.06	0.24	0.24	0.24	0.24			
			1.1.3 400 Training Events in every year (1 training = 4 days) (Lump Sum) (25 training/year/state (i.e. 16 states))		-	136	136	136	136	545	682	682	682			
			1.1.4 1 Coordinator for IWRM Training with an FASc based at LESTARI, UKM (RM15,000/month)		-	0.02	0.18	0.18	0.18	0.56	0.9	0.90	0.90			
			1.1.5 5 Assistants to facilitate IWRM Training based at LESTARI, UKM (RM5,000/month)		-	0.30	0.3	0.3	0.3	1.2	1.5	1.5	1.5			

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WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability														Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
			1.1.6 Honorarium for Resource Person (RP) to facilitate IWRM Training (Lump sum RM10,000/pax/ training x 1,567 pax)		-	0.27	0.38	0.38	0.37	1.40	2.8	4.2	7.0			
	2. Reiterate importance of rivers as water resources for human and the environment	2.1 online education tools	2.1.1 Expand digital platforms/tools for teaching and learning	KASA	-	0.2	0.2	0.2	0.2	0.8	-	-	-	12MP		
			2.1.2 Develop simulation-based games, mobile platforms, virtual environments, and augmented reality tools to heighten curiosity and increase learner engagement.													
			2.1.3 Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively.	KASA	-	5.20	5.20	5.20	5.20	20.80	26.00	26.00	26.00	12MP and Beyond	Involving 2,445 secondary schools	
			2.1.4 Establish one-stop educational resources and activities on water and climate change in Digital Educational Learning Initiatives Malaysia (DELIMa) platform.	KASA	-	0.20	0.20	0.20	0.20	0.80	-	-	-	12MP	All schools can access the educational resources and activities in DELIMa.	
	3. Inculcation of local values	3.1 showcase the project-based learning (PBL)	3.1.1 Establish a single, searchable, user-friendly online resource for finding water- and climate-related	KASA	-	0.20	0.20	0.20	0.20	0.80	-	-	-	12MP		

continue

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continued

WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability															Focus area
	Strategy	**Programmes/ Initiatives**	**Activities**	**Lead Ministry/ Organisation**	**Budget (RM '000,000)**									**Target Completion**	**Remarks**	
					2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**			
			education programmes and resources and funding opportunities as well as to showcase the project-based learning (PBL) activities that were conducted by schools (using a new or enhanced platform).													
	4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 encourage interactive communication between HEIs (public and private) and public	4.1.1 To establish an interactive tool that encourage interactive communication between HEIs (public and private) and public	KASA	-	0.05	0.05	0.05	0.05	0.2	-	-	-	12MP	The interactive tool can be used in different platforms, such as Windows, Mac, Android, iOS etc.	
	5. One-stop Training Centres at national and state	5.1 Water One-Stop Training Centre	5.1.1 Establish Water One-Stop Training Centre	KASA (DOE)	-	0.10	0.10	0.10	0.10	0.40	0.50	0.50	0.50	12MP and Beyond	Using existing training centres for business and industry module training.	
	6. Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction.	6.1 To develop and establish an Apps to share/link data needed for the community to decide on river basin.	6.1.1 Myriverbasin Apps	KASA & State BKSA	-	-	-	-	-	1.00	-	-	-	Developed during 12MP		
Finance	1. Adequate funds for non-structural capacity building towards IWRM.	1.1 To implement comprehensive AACB programme at the PPPs.	1.1.1 Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/training x 232000 units)	KASA/KPKT/ MOH	-	-	62.5	62.5	257.5	385.2	65	65	65	12MP and Beyond	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.	Finance
	2. Reiterate importance of rivers as water resources for human and the environment	2.1 Adequate fund and finance	2.1.1 All the activities proposed above required financial support from the government.	KASA	-	-	-	-	-	-	-	-	-	12MP and Beyond	Please refer to the proposed budget in respective focus areas.	

continue

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continued

WST2040 Budget Requirements

Focus area	Water as a Resource/Water Security and Sustainability														Focus area
	Strategy	Programmes/ Initiatives	Activities	Lead Ministry/ Organisation	Budget (RM '000,000)									Target Completion	Remarks	
					2021	2022	2023	2024	2025	Total 12MP	13MP	14MP	15MP			
	3. Inculcation of local values	3.1 Adequate fund and finance	3.1.1 All the activities proposed above required financial support from the government.	KASA	-	-	-	-	-	-	-	-	-	12MP and Beyond	Please refer to the proposed budget in respective focus areas.	
	4. Emphasise different responsibilities but common goals in ensuring good water quality and adequate water quantity	4.1 Adequate fund and finance	4.1.1 All the activities proposed above required financial support from the government.	KASA	-	-	-	-	-	-	-	-	-	12MP and Beyond	Please refer to the proposed budget in respective focus areas.	
	5. Introduce new category in Green Incentives that is related to water management project	5.1 Promoting more business and industry to adopt and implement water management project in their premises.	5.1.1 Water incentives	MIDA	-	1.9	1.9	1.9	1.9	7.5	7.5	7.5	7.5	12MP and Beyond	Promoting more business and industry to adopt and implement water management project in their premises. 7.5M (1pax = 150K)	
	6. Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody	6.1 Giving tax exemption to business and industry for their contribution in conserving water body near their premises.	6.1.1 Company tax exemption	MOF (LHDN)	-	1.25	1.25	1.25	1.25	5.0	5.0	5.0	5.0	12MP and Beyond	Giving tax exemption to business and industry for their contribution in conserving water body near their premises. 5M (1pax = 100K)	
	7. Give awards and recognitions to business and industry that succeed in applying best management practices in their premises	7.1 Giving annual award and recognition as a publicity for business and industry to improve their sustainability image.	7.1.1 Water Sustainability Award	KASA	-	1.9	1.9	1.9	1.9	7.5	7.5	7.5	7.5	12MP and Beyond	Giving annual award and recognition as a publicity for business and industry to improve their sustainability image. 7.5K (event)	
	8. Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction.	8.1 To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	8.1.1 To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	MSAN	-	-	-	-	-	-	-	-	-	12MP and Beyond	Will be consolidated with the local plans/ IRBM plans	

*Roadmap Water for Livelihood and budget consolidated with the water as a resources' roadmap.:

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6.0 WAY FORWARD – 8I ECOSYSTEM APPROACH

Water management from the perspective of AACB and PPPs have been experiencing significant pressures from various dimensions considering the environmental, economic, and socio-cultural aspects. Hence, water management i.e. water as natural resources and water as a livelihood should be addressed from the total ecological management perspective for a flourished dynamic economic sector to contribute significantly in sustainable development. Therefore, the AACB and PPPs issues can be addressed under each component of 8i model for accelerating the implementation of IWRM.

i. Infrastructure

There have been limited water training centres which led to a poor training rate in the water sector and the absence of common platform to integrate the ongoing AACB programmes and initiatives.

ii. Info-structure

Due to data conundrum, stakeholders articulate clear demand, though not all groups are well developed or organised. Case-by-case decision-making for data request hinders responsiveness and predictability of data provision.

iii. Intellectual Capital

Inadequate people/expert with specialised knowledge about advocacy, technical issue, decision making, leadership, communication, and entrepreneurship skills.

iv. Integrity

Fragmented and silo water resources management and lack of digitalisation of water resources management adherence to the transparency and accountability into the management and assessment of water industry performance.

v. Incentives

Lack of fiscal incentives, reward and recognition and monitoring for stakeholder's initiatives. Lack of common platforms to integrate all initiatives. No specific allocation for research related to water. In addition, there is no compilation of existing research that is related to water.

Fragmented and Event-based fund such as thorough fund by the government (both Federal and State level), private business & industry through corporate social responsibility (CSR) programmes, NGOs/CBOs through fund crowdsourcing and membership and academia through a research grant. Some awareness, advocacy and capacity building of water management were also based on the corporate social responsibility of industries and business.

vi. Institutions

Although countless programmes and training have been developed at governments, community, academia, and business/industry levels to create awareness on the importance of water management & to support the national policies, there is still a general lack of understanding of water management.

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vii. Interaction

The level and quality of cooperation, collaboration and knowledge sharing between stakeholders, are patchy and fragmented. For example, there are existing overlapping roles and rules of engagement not clearly articulated.

viii. Internationalisation

Adherence to global best practices remains a challenge. The level of two-ways technology and knowledge transfer is low.

Based on the gaps, the key solutions are identified as below:

i. Infrastructure

IWRM training centres such as Pusat Informasi Sungai and others should have adequate online/on-site facilities considering the uncertainties. Hence, there should be sufficient advocacy for IWRM by the civil servants via ToT using AACB training programme. Considering the uncertainties such as man-made and natural disasters, including the pandemic Covid-19, there should be both virtual and on-site role-play of water experts at the training centres and at the PPPs to enhance local government's decision-making processes of IWRM.

ii. Info-structure

IWRM should have an integrated and comprehensive data-sharing framework to accelerate its implementation in Malaysia. Therefore, to ensure the flow of reliable data and information from relevant agencies to the local government for IWRM, there should be an effective mapping of stakeholders for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information to ease the decision-making processes for IWRM. Moreover, developing and promoting common platforms for government officials also should include all the relevant stakeholders for IWRM. For example, the development of a website (portal) or podcast channel, establishing or promoting community-based River Care Centre, nationwide roadshow, using the existing local community centres, identifying successful NGOs/CBOs as IRBM local champion and trainers and as such will be useful to share information related to IWRM, IRBM and WST2040.[4]

Continuous RDCI (i.e. research, development, commercialisation, and innovation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDCI will effectively facilitate the real-time decision making of civil servants, especially at the local level, to promote decision-making processes quickly. In this regard, the stakeholders' mapping, series of dialogue and consultations amongst the Federal, State, and local level stakeholders will also justify the use of real-time data and information coming from RDCI for IWRM.

iii. Intellectual Capital

The resource person of IWRM is crucial to build the capacity of civil servants via the training on AACB WST. This resource person will train the civil servants using the training module of AACB and it will become the ToT.

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[4] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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Hence, the civil servant will effectively advocate IWRM via training programme as well as will institutionalise the public participatory platforms (PPPs) for the effective decision-making processes of IWRM. The IWRM training via AACB training programme will enhance the participation of civil servants in PPPs to ease decision making for IWRM. Therefore, the training of 154 local authorities and 171 district officials will have the proactive leadership roles to accelerate the implementation of IWRM.

Capacity building and continuous improvement of civil servants can be strengthened via enhancing their communication skills, river care knowledge, environmental subjects such as ecology, general organisation and management skills and others in related subjects. Soft skills training on public outreach such as series of workshops and site visits will enhance the awareness and capacity of all stakeholders: Politicians; Government staff, private sectors, and public/local communities. Moreover, enhancing the River basin understanding of the government officials will be effective via developing awareness material to educate the government officials on river basin concept in line with IWRM, IRBM, ICZM and as such. Enhancement and promoting river address, developing a simple brochure, video, etc. will also enhance the awareness of the civil servants on IWRM.

iv. Integrity

AACB training module aspires to enhance civil servants' leadership roles to facilitate the enforcement of policies and laws for a better water governance. To enhance the enforcement capacity of civil servants through AACB training programme, Dato' Ir. Nor Hisham bin Mohd. Ghazali, Director General- Department of Irrigation and Drainage Malaysia has offered 164 JPS district officials whom will train civil servants for ToT on IWRM from the perspective of integrated river basin management authority.

AACB training module also will motivate civil servants to manage water resources from the perspective of disaster risk reduction to minimise future disaster from man-made and natural sources. Therefore, promotional materials have been developed to give awareness for civil servants on number of water catchment areas gazetted for protection, number of Integrated River Basin Management (IRBM) Studies undertaken, % National Water Balance System (NAWABS) for river basins, number of Integrated Shoreline Management Plans developed, number of National Coastline Erosion Studies completed, number of states with National Flood Forecasting Warning Programme developed, number of Drainage Master Plans for major cities developed, number of flood storage ponds constructed, and as such.

v. Incentives

Fragmented and Event based fund such as thorough fund by government (both Federal and State), private business & industry through corporate social responsibility (CSR) programme, NGOs/CBOs through fund crowdsourcing and membership and academia through research grant. Some awareness, advocacy, and capacity building of water management were also based on industries and business' corporate social responsibility initiatives.

There should be adequate funds for non-structural capacity building towards IWRM, comprehensive AACB programme at the PPPs, finance for the pool of water experts to advocate IWRM and training future water leaders using the facilities at the National Training Centres. Incentives and award should be provided for the green watershed restoration, as well as nature-based solutions for the watershed restoration. Green incentives and certification, and recognition should be given to the SMEs (i.e. small and medium enterprises) by the local government for attending the AACB WST Training programme before water servicing licensing and relicensing.

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Continuous Federal funding is also very vital for the rehabilitation and restoration of river basin management. The AACB training programme will enhance the leadership roles of civil servants for rehabilitation and restoration of river basin management. Federal funding is the main strength to adopt the green economic approaches for IWRM in Malaysia. Therefore, adequate green funding along with training will encourage civil servants for sustainable water resources management while applying green economic approaches such as 'payment for ecosystem services', application of 'polluter pays' principle, and uniform pricing model for water resources, and as such. Moreover, water-based recreation and tourism activities via AACB training programme also will encourage local authorities to promote local level income generation while incorporating the local communities.

vi. Institutions

An institution such as the local government is crucial to enforce the rules and regulations for IWRM. Therefore, local government should be given the appropriate tools to measure the quality and quantity of waters under their jurisdiction. The local government should also have tools/applications and familiar to use software to monitor water quality and water quantity for IWRM. In contrast, the locals will be the first person to report any water issues.

vii. Interaction

Partnerships between agencies and joint programmes between government sectors are the keys to a successful IWRM. Collaboration and smart partnership also help build linkage to enhance knowledge and help foster connectivity between agencies to develop a common sense of ownership. Initiatives through training, hands-on workshops, site visits, public dialogues, workshops, events, peer to peer learning, and project networking amongst government agencies, e.g. between DOE, DID, KPKT, JPP, etc. will accelerate the implementation of IWRM.

viii. Internationalisation

International networking and collaboration are essential to enhance the leadership skills of government officials in IWRM via knowledge sharing and country comparisons on IWRM. Therefore, the National Research and Capacity Building institutes' endeavour to enter into strategic alliances with renowned regional and international water research and training centres will bring mutual benefit. Moreover, regular participation in reputed water-related international water fora by the civil servants will enhance their leadership skills and capacity in water management.

7.0 AACB AND PUBLIC PARTICIPATORY PLATFORM STATE OF KNOWLEDGE

Malaysia has been promoting Integrated Water Resource Management (IWRM) for ages. However, there have been few issues which has yet been resolved on the water management system in Malaysia which includes river pollution caused by licensed and unlicensed factories, wet markets, livestock farms, restaurants, food stalls, squatters and even individuals who dispose of their rubbish indiscriminately.

Generally, there are other issues on human behaviour which includes:

a. Do not regard the river as a living entity that plays a very important role in their lives.
b. Not aware and do not care about river pollution.

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c. Put the entire responsibility of preserving and conserving our rivers to the authorities.
d. Misconception that water that runs from their taps originates from the clean dams.
e. Unaware that the water usage daily is actually water that has undergone treatment after being sourced from the mostly polluted downstream rivers.
f. Not aware that every piece of trash discarded indiscriminately by the community will be swept into the drainage system before it floats to the retention pond, then the tributary and river and, finally, into the sea.

Malaysia is blessed with water. The climate of Malaysia is a tropical climate with continuous high temperatures and high relative humidity. These were due to the northeast and southwest monsoons. This situation leads to heavy rainfall especially at the east coast of Peninsular Malaysia and at Sabah and Sarawak as well. In April to September, due to southwest monsoon, Malaysia again received a rain bearing winds. In between the monsoon, Malaysia also received two transitional periods between the monsoons (inter monsoon) where convectional thunderstorms are common. Malaysia received annual average of rainfall approximately 2420 mm for Peninsular Malaysia and 2630 mm for Sabah and 3830 mm for Sarawak. The most affected area is at east coast of Peninsular Malaysia and the coastal regions of Sabah and Sarawak. During these seasons, Malaysian will experience the abundancy of water.

With blessed quantity of water (rainfall), the flood risk emerged. The Malaysia Drainage and Irrigation Department categorise floods in Malaysia into 2 categories which are flash flood and monsoon floods (DID, 2000a). The flash floods usually take approximately few hours to recover. Meanwhile monsoon floods might take more than a month to recover. According to the Belgium-based Centre for Research on the Epidemiology of Disasters (CRED), almost 70% of floods happen due to monsoon or riverine floods. Despite the condition, both types of floods have severely impacted the quality of life and economic growth in the country and can result in severe damage and loss of property, and occasionally loss of human lives (Taib et al., 2016). According to the damages incurred have been severe: Emergency Events Database (EM-DAT) collected by CRED showed that Malaysia has sustained a total damage of approximately US$2 billion (RM8 billion) in the period of 1998 to 2018. This showed that the impact of floods was extremely severe.

Taking for example of floods disaster happen in 2014 which majorly affected Kelantan. These floods are extensive, catastrophe and unpredictable and result in significant casualties, damage to crops, livestock, property, and public infrastructure. The post-mortem event conducted by the Kuala Krai District Council found that there were two causes of the flood. Firstly, the climate change and the adverse weather effects. Secondly, uncontrolled land management and the swelling number of trees and exploitation of land resources. The 2014 flood prolonged for two months and affected more than 200,000 people with 21 casualties.

According to Malaysia Drainage and Irrigation Department, there is total of 189 river basins (89 of the river basins are in peninsular Malaysia, 78 in Sabah and 22 in Sarawak), with the main channels flowing directly to the South China Sea and 85 of them are flood prone. The estimated area vulnerable to flood disaster is approximately 29,800 km^2. Thus, it is very crucial for Malaysia to ensure the water management was done properly, especially in river basin level (Durumin Iya et al., 2014).

Malaysia has experienced floods for ages. Since then, many counter measures have been conducted to reduce the risk of the flood (Chan, 2012). Some of the flood risk counter measure were the establishment of the Permanent Flood Control Commission, establishment of flood disaster relief machinery, carrying out of river basin studies and preparation of drainage master plans for major towns, implementation of structural

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measures, implementation of non-structural measures, setting up of flood forecasting and warning systems, setting up of a nation-wide network of hydrological, flood data collection stations and flood tunnel project at the city centre which called SMART tunnel.

With no regards to climate change, it is necessary for Malaysia to adopt a more holistic approach towards flood management via a multi-disciplinary effort. As per current practice, non-structural measures are easy to implement, less expensive and community-friendly, and need to be employed more widely. However, there is also a need for better stakeholder participation, especially from the community and NGOs at all levels in the disaster cycle. It is necessary for empowerment of awareness, advocacy and capacity building for all stages of stakeholders which covered government, business industries, academia, NGOs, local communities, especially potential disaster victims.

The disaster management mechanism should also adopt more non-structural measures, bring in state-of-the-art technology and collaboration internationally with other countries for addressing transboundary disasters. However, the awareness raising, and advocacy of disasters should be self-controlled while disaster indemnity should be introduced, and disaster legislation strengthened.

Even though blessed with water, the tropical climate does not always bring fortune. There was the time that Malaysia experience less water. With less rainfall, dams and river were drying. Climate change worsened it more. To make things worse, water pollution especially water source pollution has yet able be carter in Malaysia. In 2020, Klang Valley and Selangor had experience series of water disruption due to water source pollution and burst pipe as below:

a. 3rd September 2020: The Sungai Selangor Phase 1, 2, 3 and Rantau Panjang Water Treatment Plants which were forced to stop operation yesterday due to pollution at the raw water source. A total of 1,292 areas in seven regions in Klang Valley experienced unscheduled water supply disruption.
b. 22nd July 2020: Several areas in Klang and Kuala Langat were expected to experience unscheduled water supply disruption following a water pipe burst incident at Jalan Johan Setia and Jalan Langat, Klang.
c. 29th May 2020: Eight areas in Hulu Selangor faced unscheduled water supply disruption following the contamination of raw water source due to a crash involving a diesel tanker at KM389.5 of the North-South Highway near Behrang, Selangor on Thursday. The eight areas were Kampung Sungai Nilam or Kampung Seri Pagi; Kampung Lalang Sungai Selisek; Rumah Murah Pkt 2; Kampung Serigala; Kampung Orang Asli Serigala; Kampung Bahom; Kampung Sekolah and clinic quarters; as well as Kampung Gesir Tengah.

At late February 2019, Former Minister of Energy, Science, Technology, Environment and Climate Change, YB Yeo Bee Yin revealed that there were 25 'dead' rivers in Malaysia. Sixteen of the rivers were in Johor, five in Selangor, three in Penang and one in Malacca as showed in **Figure 7.1.** These rivers were categorised under Class 4 and Class 5, reserved for rivers that are highly polluted and in which aquatic life cannot survive. According to the Department of Irrigation and Drainage, there are 2987 rivers in Malaysia. It is not impossible that by the next 10 to 50 years, the number of dead rivers will increase.

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Public apathy, illegal factories main causes of river pollution

20 MAR 2019 / 14.54 H.

Minister of Energy, Science, Technology, Environment and Climate change Yeo Bee Yin showing the pollution readings of Sungai Kim Kim — Bernama

KUALA LUMPUR: At late February 2019, Minister of Energy, Science, Technology, Environment and Climate Change Yeo Bee Yin revealed that there were 25 'dead' rivers in Malaysia.

Sixteen of the rivers were in Johor, five in Selangor, three in Penang and one in Malacca. These rivers were categorised under Class 4 and 5, reserved for rivers that are highly polluted and in which aquatic life cannot survive.

Figure 7.1: News clipping on dead river in Malaysia (The Sun Daily, 2019)

The major fallback in river pollution happened in 2019, where the accident of toxic pollution at Sungai Kim Kim, Pasir Gudang as showed in **Figure 7.2**. The 2019 Kim Kim River toxic pollution is a water pollution incident that occurred on 7th March 2019 caused by illegal chemical waste dumping at the Kim Kim River in Pasir Gudang, Johor. The illegal dumping released toxic fumes, affecting 6,000 people, and hospitalising 2,775. Most of the victims were school students – 110 schools located near the river were subsequently closed.



111 sekolah diarah tutup serta-merta

Schools affected by Sg Kim Kim chemical dumping

Penyelarasan, tindakan lemah

TheStar

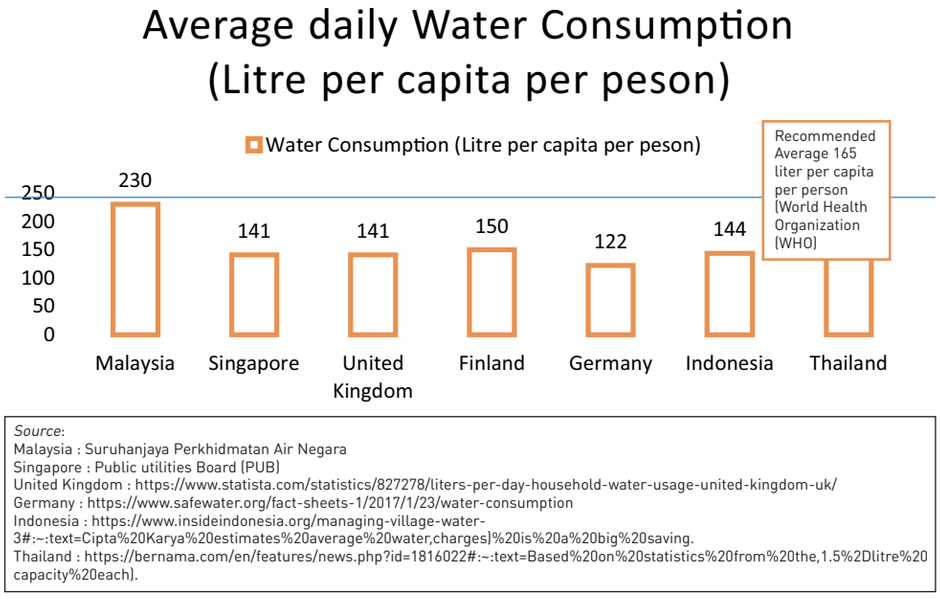
Set the culprits!

Figure 7.2: News clipping on river pollution at Sungai Kim Kim, Pasir Gudang

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The rapid population growth has also increased water supply demand and increase the probability of water pollution due to higher human activities. The population growth also has led to the demand of rapid urbanisation and development which directly impact the water resources availability. The Department of Environment (DoE) Malaysia defines water pollution as contamination of water bodies, usually because of human activities. This has led to a depletion of water resources in Malaysia.

Based on statistics from the National Water Services Commission (SPAN), Malaysians consume an average of 201 liters of water per person per day, which is equivalent to 134 bottles (1.5-litre capacity each) as shown in **Figure 7.3.** Malaysia's average daily per capita consumption is higher than the 165 liters a day as recommended by the World Health Organization (WHO), as compared to other countries such as Singapore, Indonesia and Thailand.



Source:
Malaysia : Suruhanjaya Perkhidmatan Air Negara
Singapore : Public utilities Board (PUB)
United Kingdom : https://www.statista.com/statistics/827278/liters-per-day-household-water-usage-united-kingdom-uk/
Germany : https://www.safewater.org/fact-sheets-1/2017/1/23/water-consumption
Indonesia : https://www.insideindonesia.org/managing-village-water-3#:~:text=Cipta%20Karya%20estimates%20average%20water,charges)%20is%20a%20big%20saving.
Thailand : https://bernama.com/en/features/news.php?id=1816022#:~:text=Based%20on%20statistics%20from%20the,1.5%2Dlitre%20capacity%20each).

Figure 7.3: Comparison of Average daily Water Consumption (Litre per capita per person)

At the moment, there have been much awareness raising programme and initiatives conducted by many water sector related agencies for instance, the Ministry of Environment and Water (KASA), Department of Environment, Lembaga Urus Air Selangor (LUAS), Department of Irrigation and Drainage, Suruhanjaya Perkhidmatan Air Negara, Local Authorities, NGOs such as WWF-Malaysia, Academia Malaysia Water Academy, Malaysia Water Partnership, Eko-relawan, Trash Hero and many more.

In terms of Capacity Building, currently, water-related training is mainly provided by sector such as ministries and water operators along sectoral lines and targeted mainly at their own personnel. Some examples of past initiatives to involve users and beneficiaries in water supply programmes including farmer's participation in tertiary system development and O&M activities under the Ministry of Agriculture; the "water forum" presented by KASA; and "*rakan tasik*" or "river brigade" initiated by some states to support water resource management. Such initiatives must be intensified in the future. There is a potential for a greater stakeholder participation when programmes such as IRBM and WDM are implemented and operational.

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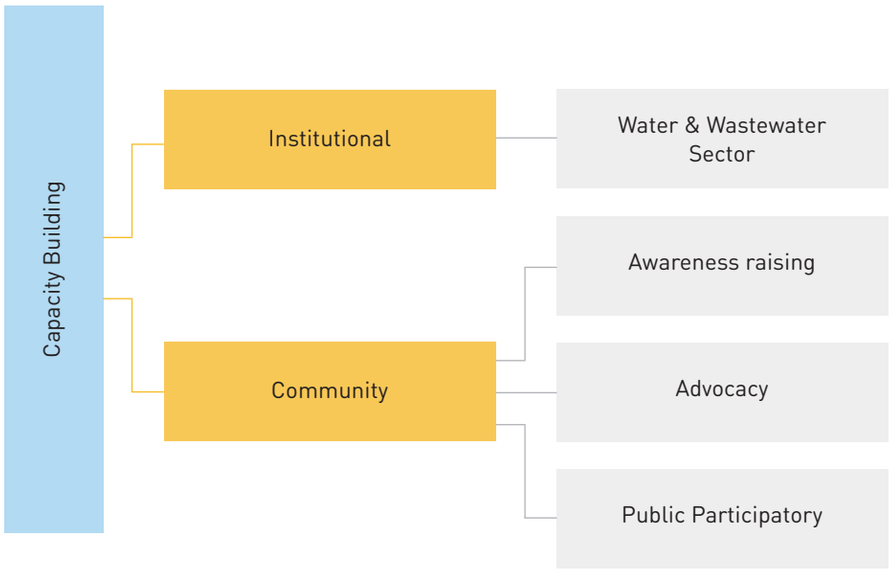


Figure 7.4: Capacity Building focus

Suruhanjaya Perkhidmatan Air Negara (SPAN) has developed a comprehensive standard reference document in producing quality and competent employees known as the National Occupational Skills Standard (NOSS) developed in line with the provisions under the Water Services Industry Act 2006 (Act 652). The Malaysian Skills Certification System is also in line with the requirements of Section 49 of the Water Services Industry Act 2006. Currently, the focus on compliance with this requirement is on the individual licensee (services) who is the water supply operator. The current capacity building for the institution is focussed on technical capacity development (Development, Department of Skills & Ministry of Human Resources, 2016).

So far there are 24 NOSS (out of 64 NOSS) water supply sectors and 12 NOSS (out of 36 NOSS) sewerage sector. However, SPAN has taken the initiative to develop additional 4 NOSSs and is currently planning for implementation as listed in **Table 7.1** below:

Table 7.1: Additional 4 NOSSs and is currently planning by SPAN

Bil	Standard Title	Level Proposed	Section Proposed
1	Consumer/Customer Service (Meter Reading and Billing)	2	E – Water Supply, Sewerage, Waste Management And Remediation Activities
2	Consumer/ Customer Service (Meter Reading and Billing)	3	
3	Sewerage Infrastructure Development (Asset Management)	2	
4	Sewerage Infrastructure Development (Asset Management)	3	

There are many IWRM experts and talents in Malaysia from academia, government, NGOs, and the community. They are very useful and important assets in ensuring the acceleration of the implementation of IWRM in Malaysia. Some of them get specialised education in core streams at the university. Meanwhile, some of them are mobilisers and practitioners in their respective residential areas. Also some of them become an

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expert because of training and experience from their careers. They are agents of knowledge transfer to the community and very valuable advocator in the community. These experts need to be identified to assist as an advocate for the implementation of IWRM.

There have been ongoing AACB programmes at federal levels. AACB SUB-SECTOR has collected data from several agencies as listed in **Table 7.2** below:

Table 7.2: On-going AACB and PPPs programme and initiatives at federal level

No.	Activity	Date	Medium	Collaboration Agencies
	Suruhanjaya Perkhidmatan Air Negara (SPAN)			
1	NRW reduction campaign	Occasion	Newspaper (BH & NST)	-
2	Water Conservation Campaign	Occasion	Jayerawara	Kerajaan Negeri Kedah
3	Clean Water Conservation Campaign	Occasion	Electronic media (RTM, TV1)	RTM
4	Sludge Removal Campaign	Occasion	Video/Graphic (social media)	ML Studios
5	Clean Water Conservation Campaign	Occasion	Electronic media (Bernama TV)	Bernama
6	Sustain Environmental Conservation Campaign (Water)	Occasion	Billboard	-
7	NRW Reduction Awareness Campaign	Occasion	Video/Graphic (social media)	ML Studios
8	Clean Water Conservation Campaign	Occasion	Electronic media (TV Al Hijrah)	TV Al Hijrah
9	Enforcement Activities (water theft)	Occasion	National Media	Pengurusan Air Selangor
10	Enforcement Activities (water theft)	Occasion	National Media	Pengurusan Air Selangor
11	Enforcement Activities (waterway pollution)	Occasion	National Media	LUAS & Air Selangor
12	Stop River Pollution Campaign	Occasion	Press (BH & NST)	-
13	Campaign to Stop Scheduled Waste Disposal into Public Sewerage Channels	Occasion	Social media	-
14	Product Use Campaign with Water Efficient Labels	Occasion	Social media	-
15	Enforcement Activities (odour pollution)	Occasion	National Media	JAS & LUAS
16	Enforcement Activities (waterway pollution)	Occasion	Social media	-
17	Enforcement Activities (pollution of water resources)	Occasion	National Media	-
18	Collaboration on SPAN with Mara TVET Students - Online	Occasion	Facebook	MARA
19	OPS AIR RAYA (pollution of sewers and watercourses)	Occasion	Social media	-
20	Enforcement Activities (water theft)	Occasion	National Media	Air Selangor Management
21	Enforcement Activities (water theft)	Occasion	National Media	Air Selangor Management
22	Talk about Water Pollution	Occasion	Electronic media (Bernama TV)	Bernama
23	Enforcement Activities (water theft)	Occasion	Social media	RSAJ
24	Malaysia Prihatin : Consumer Water Resources (interview)	Occasion	Electronic media (RTM, TV1)	RTM
25	Enforcement Activities (water theft)	Occasion	Social media	SATU
26	Enforcement Activities (water theft)	Occasion	Social media	SAINS

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continued

No.	Activity	Date	Medium	Collaboration Agencies
	Suruhanjaya Perkhidmatan Air Negara (SPAN)			
27	Enforcement Activities (water theft)	Occasion	Social media	SAINS
28	Enforcement Activities (water theft)	Occasion	National Media	Air Selangor Management
29	Enforcement Activities (water theft)	Occasion	National Media	Air Selangor Management
30	Water Conservation is our Responsibility	Occasion	Electronic media (RTM, TV1)	RTM
31	Talk about the Implications of River Pollution	Occasion	Electronic media (Bernama TV)	Bernama
32	Video Campaign: Save Water	Occasion	Social media/ Electronic media	RTM
33	Video Campaign: The Impact of Climate Change	Occasion	Social media/ Electronic media	RTM
34	Environmental Conservation Discussion	Occasion	Webinar	
35	Video Campaign: Don't Contaminate Water Resources	Occasion	Social media/ Electronic media	RTM
36	Gotong-royong Community Water Pipe	Occasion	Social media	Kerajaan Negeri Kedah
37	Video Campaign: Water Treatment Process	Occasion	Social media/ Electronic media	RTM
38	Enforcement Activities (odour pollution)	Occasion	National Media	JAS, LUAS, IWK, MPS
39	Interview on Water Pollution	Occasion	Electronic media (RTM, TV1)	RTM
40	Radio Campaign - The Role of SPAN	Occasion	Manis FM	Manis FM
41	Prosecution Case Workshop to Certification Agency (Sewerage) under Sections 20 & 45 of Act 655	Yearly		SPAN dan Operator Sewerage
42	Product Compliance Audit Training	Yearly		SPAN and related agencies
43	Enforcement Workshop Programme Under Act 655 And Anti-Corruption Programme	Yearly		SPAN dan Operator Air dan Sewerage
	Department of Environment			
1	22 April - Hari Bumi	Yearly	Physical/Online	
2	5 Jun – Hari Alam Sekitar Sedunia	Yearly	Physical/Online	
3	16 September – Hari Ozon Sedunia	Yearly	Physical/Online	
4	21 Oktober – Hari Alam Sekitar Negara	Yearly	Physical/Online	
5	Kem Kesedaran Alam Sekitar	Yearly	Physical/Online	
6	Program Rakan Alam Sekitar; a. Denai Sungai Kebangsaan b. Friend of River c. Aktiviti gotong royong di kawasan sungai d. River Rangers bersama NGO e. Rakan Saintis Sungai	Yearly	Physical/Online	
7	Anugerah Sekolah Lestari Anugerah Alam Sekitar Modul pengurusan/kepentingan sumber air	Yearly	Physical/Online	
8	Pameran bertemakan alam sekitar	Yearly	Physical/Online	
9	Pidato Alam Sekitar	Yearly	Physical/Online	
10	Anugerah Langkawi Kelestarian Alam Sekitar	Yearly	Physical/Online	
11	Pertandingan 3 Minit Tesis Alam Sekitar Bahasa Melayu	Yearly	Physical/Online	

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There are few non-government organisations established that actively providing the AACB initiatives. The organisation as below:

a. Malaysian Water Academy Sdn Bhd (MyWA)

Malaysian Water Academy Sdn Bhd (MyWA) is a wholly own training provider by The Malaysian Water Association (MWA) to fulfil the role of developing human capital for the water and wastewater industry. MyWA is registered under Companies Commission of Malaysia (888975-M) and also a certified training provider by the Human Resource Development Fund (HDRF). On April 7th, 2010, MyWA was officially launched. Generally, MyWA programmes are open to the public audience and redesign into in-house programme depending on the needs of organisation. MyWA offered technical training programmes, generic training programmes and seminars and forums.

The main aim for MyWA is to establish a capacity building hub for all stakeholders of water and wastewater industry. The objectives are:

1. To provide institutional support for government initiatives towards the development of quality workforce for increasing the global competitiveness and liberalisation of the water industry.
2. To provide integrated and accredited education and training for all stakeholders across public and private divide of the water and wastewater sector.
3. To provide strategic platform for collaborative research and innovations between academia and industry, local and foreign experts.
4. To safeguard professionals' standards of the water and wastewater sector education and training; and
5. To become a one-stop Centre for the sourcing of expertise in the water and wastewater sectors.

The core function of MWA as the following:

1. Support MWA as an Industry Lead Body (ILB) for the water industry.
2. Identify and establish industry training needs in water and wastewater sector.
3. Conduct accredited and certified training programmes.
4. Establish smart partnership with leading research and development institutions for water and wastewater.
5. Create opportunity for Young Water Professionals to participate and obtain knowledge, experience, and skills through various association activities.
6. Provide platform for senior Professional Members to interact and share the knowledge, experience, and skills to younger generation.
7. Service as platform for developing knowledge-based workforce.
8. Conduct collaborative research on emerging skill needs in the water industry.
9. Participate in aiding vulnerable communities during disasters via its trained Emergency Relief Squad (ERS).

Example of training provided are:

1. SKM Training Course Via PPT-Drinking Water Treatment Process & Water Quality Analysis
2. Technical Control of Activated Sludge
3. Technical Control of Sludge Bulking
4. In house Application of Mathematics in Water and Wastewater Treatment Plant Operation
5. Technical Control of Nutrient Dosing in IETS

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6. In house Application of Mathematics in Water and Wastewater Treatment Plant Operation
7. Training Workshops on Water Supply & Wastewater (ASIA WATER)
8. Sludge Handling Operation & Management
9. Lab Quality Management System
10. Corrupt Practices in Water Industry: Impacts and Preventive Strategies

Malaysia also has implemented integrated urban water resource management recently. The example of the project as below:

a. *River of Life*

The River of Life (ROL) is a seven-year project headed by the Government of Malaysia to transform the Klang River into a vibrant and liveable waterfront along with the high economic value. Meanwhile, the ROL project has been successful to ensure the involvement of several communities along the Klang River Basin, especially via the recycling as well as river monitoring and pollution mapping activities. Some of the communities that are involved with ROL project are as follows- Wangsa Melawati Green Community (WMGC), Persatuan Rekreasi Taman AU3 Kuala Lumpur (PRTAU3), AU2 Committee Rukun Tetangga, Sierra Ukay Community (SEGORA), KRT Perumahan Awam Seri Terengganu, KRT Kampung Kasipillay, KRT Kampung Segambut Dalam, KRT PPR Beringin and as such. Some of the community involvement activities of ROL project are Recycling Initiative with Communities: Recycle for Life, Program Jaringan Komuniti (Community Networking Programme)- River Monitoring and Pollution Mapping, and as such.



Source: http://www.klriver.org/index.cfm?&menuid=4

Figure 7.5: River of life panning

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The platform, Friends of Klang River Basin, covers eight (8) rivers within the Klang River Basin along with a total length of 110 km. The main activities of the Friends of Klang River Basin are divided into three (3) major components:

1. River Cleaning (led by Department of Irrigation and Drainage (DID) Malaysia)
2. River Beautification (led Kuala Lumpur City Hall (DBKL))
3. Commercialisation and Tourism (led Ministry of Federal Territory (KWP))

Target groups of the Friends of Klang River Basin and its initiatives are:

1. Educational institutions- Issues related to solid waste management from the inside and outside of the campus as well as the waste disposal from the cafeterias and canteens into drains.
2. Local communities- Issues related to household wastes disposal into the drains, riverbanks, and residential areas, as well as sewerage wastewater discharges and riverbank encroachment.
3. Food establishments, wet markets, and automobile workshops-Issues related to food waste disposal and inefficient management of food waste, engine oil and spare parts.
4. Industries, corporates, and developers- Issues related to inefficient management of solid waste, residual effluent and construction waste as well as mass production of waste.

Phase 1 and Phase 2 of the River of Life-Public Outreach Programme (ROL-POP) have been completed for the Upper Klang River catchment and Bunus River. The ROL-POP has now expanded to Phase 3A, 3B, 4 and 5 that covers the entire River of Life project's boundary. Global Environment Centre (GEC) is in charge to implement the ROL-POP's activities including the activities in Phase 5 area.

GEC via the ROL-POP has developed a mobile application called Citizen's Eye. Citizen's Eye is an application that has been developed to allow the Public Outreach Programme's (POP) participants as well as the public to be the eyes and ears to immediately and efficiently record any event or activity related to river management (for example, a good management practice) including pollution problems. The application is capable to provide a link about the river management activities to the local authorities for further actions.

b. *Sia Boey Urban Archaeological Park*

Sia Boey is a historic heritage area in Georgetown and is a trade hub in Penang. In 2016 the Centre for Global Archaeological Research (CGAR) of Universiti Sains Malaysia (USM) conducted a preliminary archaeological investigation after a granite structure was discovered during the construction of the bypass canal around the site. Mr. Marcus Langdon was appointed to conduct the historical study of the site. George Town World Heritage Incorporated (GTWHI) was also appointed as the Project Manager of the Sia Boey Archaeological Site on 8 August 2016 by the Penang Development Corporation.

According to the Penang Development Corporation, and the George Town World Heritage Incorporated, the canal gives the heritage site a technical and scientific significance because of the latest engineering activities to develop the canal. The important historical transportation and the flood mitigation methods along with the sluice gate made it a unique site in the Southeast Asia. The site has the archaeological significance because of its two existing archaeological sites and its archaeological potential including but not limited to a tramway line (1898–1921), a bathhouse, a bridge, and a playground.

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Figure 7.6: Canal at the Sia Boey site before the latest development in 2016 (Penang Development Corporation & George Town World Heritage Incorporporated, 2016)

A makeover project of the Sia Boey, incorporating the archeological dimension, was undertaken by the Penang Development Corporation along with the George Town World Heritage Incorporated on March 2018. An integrated site management plan was developed along with appropriate objectives to conduct the makeover project at the Sia Boey (Ming et al., 2020). The objectives are as follows:

1. To facilitate the coexistence of development activities and heritage conservation.
2. To revitalise the Sia Boey area's identity as a vibrant social centre for George Town.
3. To enhance Sia Boey for the local community and reinstate it as the entrance to George Town.
4. To integrate the proposals from various stakeholders into one management plan.

This development had cleaned up and beautify the stretch of Prangin Canal, waters of the dirty monsoon drain was diverted to a new culvert running parallel to the exposed Prangin Canal. The drain water passing through the Prangin Diversion goes through a bio-filtration system, using the Japanese bio-remediation technology. The cleaned-up Prangin Canal today is turned into a pristine koi pond.

In November 2019, the Sia Boey Urban Archaeological Park finally opened to the public, with a public square, landscaped with trees and a children's playground.

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Figure 7.7: Canal at Sia Boey before the development presence (https://www.mypenang.gov.my/culture-heritage/directory/584/?lg=en)

Institute of Labour Market Information and Analysis (2019) found that the two main factors of poor capacity building in water and wastewater industry are lack of enforcement by the regulator for the competency requirement on the state operators in operating water systems and no financial support from the government for the capacity building programmes, module development and acquisition of training equipment facilities.

At the moment, it was found that lack of environmental education in schools to create awareness on the importance of protecting the environment and to address environmental pollution is often at the forefront in improving the national education framework (Sulaiman et al., 2019). Some suggestions can be done in conducting Train-on-Trainer to build up the capacity development amongst teachers in schools. This would encourage the teachers to be innovative and have the sense of ownership in disseminating information and educating students at school with regards to water management such as water pollution and water conservation.

Elfithri et al. (2019) also highlighted that there is a need to relook at academic curricular contents at universities in order to reflect the cross-cutting nature of water. There is a need to broaden the academic curricula, for example, by providing courses on energy and agriculture to water professionals, on water resources management, and water operations to science and engineering students in other fields of study (UNESCO, 2016). Hence, there is a need to relook and reexamine the curricular contents at universities or tertiary levels to develop talented and competent people capable and interested in thinking of greener ways of working, undertaking business and providing services that are truly aligned to the 17 SDGs and 169 associated targets. Leaders, professionals, business captains, and practitioners must always thinking about how to influence and help transfer knowledge and expertise to others in their organisations, and partners.

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It is important that industries and communities be made aware of river pollution. This is because rivers are our source of water, without which we cannot possibly live. The indifferent attitude of industries and communities that will do little to change the fate of those rivers that are now almost lifeless. Malaysian needs to understand that, even though our homes may not be situated close to a river but, in truth, we are living on its basin. The basin is a catchment area from where water flows into a tributary and finally into the main river itself. If indifferent attitude of industries and communities on water management still lagging, the water issues and challenges will not be resolved. It was suggested that the role of academia in water management need to be redefined. This can be done through conducting continual on-the-job training for teaching staff, e.g., workshops and related training activities. This will be able to produce experts and professionals in academia to educate other academic staff, as their contribution to capacity building. The empowerment of academia in water management also needs to be continuously promoted to be focussed in dealing with paradigm changes.

There have been many efforts on involving the communities as part of water stakeholders and public participatory platforms in Malaysia. Few existing public participatory platforms such as Inspirasi Kawa, River rangers, Department of Environment Department of Irrigation and Drainage (DID), Friends of rivers, WWF, etc. have actively engaged with local communities to participate in AACB water programmes. However, due to some limitations, the community involvements on water management are still limited.

The community participation in IWRM implementation is not represented equally and is limited. One of the widely recognised causes of the above-mentioned failure to develop and implement IWRM is the lack of involvement of local people and communities. Participation is often limited to public consultations, where communities can merely react to plans that have already been decided. The government has installed coordination forums on environment. However, the exposure, awareness, knowledge, and skills has yet to be fully developed. The community has not been actively involved and participate in developing policy and monitoring the surrounding environment.

Ahmed et al. (2020) found that the exposure of perception on river and drinking water in Langat River basin has significantly improved the willingness of community to participate in the water management. The study suggested that responsible authorities at the Langat River Basin, Malaysia should focus on raising awareness, advocacy, and capacity building for people's effective participation in water resources management. The National Water Resources Policy 2012 mainly focus on raising awareness. However, it was found that advocacy and capacity building of the stakeholders in water management are not highlighted significantly in the policy. It is suggested that relevant agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform. People in Malaysia are aware of the importance of water quality not only for aquatic life but also for a healthy and high-quality standard of living. The communities also think that quality water is an essential requirement for economic development. The communities are willing to participate in water resources management if they are well informed and aware on the water management.

Some examples of the public participatory platforms (PPPs) are discussed below, and the information about the PPPs are based on the desktop review as well as the interviews with the personnel of the specific platforms.

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a. Malaysia Water Partnership (MyWP)

MyWP is a Non-Governmental Organisation, and its main agenda is to support and promote the adoption and practice of the Integrated Water Resource Management (IWRM) approach in all land and water resource development and management in Malaysia and elsewhere in the world with the mission to "Support our Country in the Sustainable Management of its Water Resources"

The objectives of Malaysia Water Partnership (MyWP) are:

1. To provide strategic advice to the Government and relevant stakeholders on water and water related matters with particular emphasis on the adoption of Integrated Water Resources Management (IWRM) principles and practices.
2. To promote greater awareness in IWRM among all stakeholders including the public, water users and potential polluters.
3. To provide and disseminate synthesised knowledge and experience on best management practices (BMPs) in IWRM.
4. To foster interaction amongst its members by promoting cross sectional and multi-stakeholder dialogues at local, river basin, state and national levels to meet critical needs.
5. To provide support in capacity building and training programmes and activities related to IWRM.
6. To provide support for research and development initiatives related to IWRM.
7. To act as the focal point and coordinating centre for collaborative action with similar or related organisations locally, regionally and internationally.

Under Malaysia Water Partnership (MyWP), some programmes of AACB are listed below:

1. Water, Climate and Development Programme (WACDEP)is operationalised by the Global Water Partnership (GWP) and part of African Ministers' Council on Water (AMCOW) work plan. It runs over five years from May 2011 – April 2016 with an estimated budget of 12.7 million Euros. 1. Project 1 – Strategic stakeholder forum for incorporating climate resilience in the national water resources policy action plans, 2. Project 2 – Community flood-proofing for climate resilience, 3. Project 3 – Community rainwater-harvesting for enhancing flood and drought resilience.
2. Seminar on Community Awareness and Approach in Facing the Flood Scenario organised by Global Water Partnership with Malaysia Water Partnership (MyWP), Majlis Perbandaran Klang (MPK), dan Global Environment Centre (GEC) with the support from Department of Irrigation and Draining and LESTARI-UKM.
3. Training Needs Assessment Workshop - University Kebangsaan Malaysia.
4. Workshop on Conservation of Natural Resources in Coastal Ecosystems for the Benefit of Humankind and Global Balance.
5. Universiti Sains Malaysia (USM) is collaborating with their UK counterpart in organising a workshop on Conservation of Natural Resources in Coastal Ecosystems for the Benefit of Humankind and Global Balance.
6. Malaysia National Integrated Flood Management Programme.
7. The Department of Irrigation and Drainage Malaysia and Malaysian Water Partnership (MyWP) together with Malaysia Capacity Building Network (MyCBNet) will be organising the Integrated Flood Management Programme at the national level with the theme 'The role of the local community' to build awareness amongst the participants on the action before, during and after the flood.
8. Stakeholder Consultative Workshop on River Pollution.

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9. MyWP is embarking on a new strategy to achieve that: by proposing changes at the highest level of committees chaired by the Prime Minister/Deputy Prime Minister and attended by Menteri Besar/Chief Minister e.g. Majlis Sumber Air Negara (MSAN) or Majlis Negara Kerajaan Tempatan (MNKT).
10. National Programme by Institut Fizik Malaysia (IFM) – Role of the Community.
11. Flood Management in Malaysia, MKN.
12. Flood preparedness – JPS Muar.
13. RedR Programme.
14. Malaysia Water Resources Management (MyWRM) Forum 2012.
15. Biennial Forum is organised by MyWP in close collaboration with the key federal agency responsible for water resources management in Malaysia – the Department of Irrigation and Drainage Malaysia.
16. Water Education and Awareness, UTM Workshop.
17. Resource Material for Post 7th World Water Forum Seminar.
18. Science, Technology and Innovation in River Ecosystem Protection.
19. Successfully Managing Transitions for Food Security.
20. Water Demand Management for Sustainable Future.
21. Water for Cities of Tomorrow.
22. Water for Energy Security.
23. Water for Our Future.
24. Water Related Disaster Management.
25. Water Security & Sustainable Growth.
26. Woman and Water – Agent of Change for a New Culture.
27. WWF – Outcomes.

b. Global Environment Centre (River Care Programme)

Global Environment Centre (GEC) established a River Care Programme (RCP) focussing on promoting community participation in river and water resource protection and sustainable use of it through the Civic Science approach. GEC work closely with all stakeholders in solid waste management, and water and river management, and believe that everyone has a role to play in the environment.

RCP's mission is to promote the protection, restoration and sustainable use of rivers by enhancing multi-stakeholder participation and knowledge to stimulate local action and vision to have the clean, healthy, living and vibrant rivers for people and the environment.

Objectives of the River Care Programme are:

1. Protect, conserve and promote living rivers and their biodiversity.
2. Promote restoration and rehabilitation of rivers and other water bodies.
3. Raise awareness and educate all stakeholders about river care.
4. Promote civic consciousness and local action through river monitoring and mapping.
5. Support capacity building and networking of individuals, communities and organisations in river management.
6. The focus of this programme is to promote and support the integrated management of river basins with particular emphasis on ensuring that biodiversity and wetland conservation and community considerations are incorporated into river basin management.

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GEC's River Care Programme has undertaken a range of projects and initiatives related to integrated river basin management and has involved with various partners in the following site-based riverine assessment and management projects which emphasised the community participation. RCP is working together with five target groups (i.e. general public, educational institutions, local communities, food establishment, hawkers, wet markets and workshops, industries, corporation and developers) to better understand their perception, concerns and issues about the river and implement strategies and action plans to curb the river pollution.

In 2019, RCP has managed to outreach to more than 30,000 target audiences in ROLPOP-related activities, extended community adoption by 6.8 km river stretch, community monitoring for 14.1km stretch of river and established four environmental-based community education corners. The constructed and well-established programme and module developed by GEC under RCP was tremendous. More than 300 communities were involved in this RCP programme. Other successful programmes include waste recycling and collection of used cooking oil for biodiesel, school-based initiatives via the Squad Ranger and implementation of Best Management Practices in wet markets, restaurants, industries, corporation and developers. Some examples of the River Care Programme are:

Table 7.3: River Care Programme

Project	Details	Module Developed
W.A.T.E.R Project a. W.A.T.E.R Project Water Stewardship – Water Balancing and Sustainable River Catchment Management for Selangor River Basin b. Sungai Penchala River Programme – Water Stewardship c. Sg Kinta River Education Programme	This water stewardship project is a continuation of W.A.T.E.R Project working on rivers rehabilitation and educational outreach to various stakeholders to change mindsets and adopt water conservation initiatives for protection of the water resources.	a. GEC – River Care Module 2019 b. GEC – River Report Card c. GEC Booklet – RIVER Ranger Programme d. GEC – River Ranger Water Conservation Module (School) 2016 e. GEC poster – What you have thrown today? f. GEC brochure – River Water Quality Monitoring and Classification g. GEC Poster – Water auditing
SMART (Start Managing All Resources Today) Ranger for Schools within Klang Valley	This is a project developed to support a comprehensive recycling programme through buy-back system and increase recycling practices amongst students.	h. GEC - River Report Card i. GEC poster – River ranger Klang River j. GEC booklet – River Auditing 'let's get to know our rivers!'
Integrated Management of Kinta River Basin for Community and Ecosystem Services through Active Community and Stakeholder Participation	This project is a collaborative effort of various stakeholders, especially key relevant government agencies in Perak aims to conserve and preserve the upper catchment of Kinta River Basin that serves as water supply to Orang Asli and local communities.	k. River of Life Map l. ASEAN Secretariat and GEC – Peatlands and Climate Change in Southeast Asia m. GEC – Peat for life? Peatlands & climate change adaptation n. GEC – Lake report card o. GEC – Hutan Bakau, Kuala Gula, Perak
River of Life Public Outreach Programme Phase 5 (ROL-POP 5)	The main objective of ROL-POP is to generate evidential improvement in attitudes and behaviours of target groups within the Project Area towards river care and preservation in order to improve water quality and reduce pollution within project area. Other than that, it is to promote a sense of ownership towards the river and initiating long term and sustainable change in behaviour towards preserving the river.	p. GEC – Kad Laporan Sungai q. ASEAN Secretariat and GEC – Addressing Peatland Degradation in South East Asia ASEAN's Regional Efforts r. GEC poster – Fiery Southeast Asia-Our resources, lives, future under threat s. GEC – Biological monitoring - have you ever wondered what's living inside a river? t. GEC – Handbook account for recycle SMART RANGER

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continued

Project	Details	Module Developed
Sustainable Water Resource Management for Community via Drinking Water Supply	GEC recognises the lack of clean water supply in the rural areas and amongst the indigenous communities in Malaysia. This project is initiated to find solution for this problem by providing suitable and practical alternative sources of portable water for them.	u. GEC – The Tsunami and Coastal Wetlands – Recommendations for Action v. GEC – Assessment on peatlands, biodiversity and climate change w. GEC – Assessment on peatlands, biodiversity and climate change-key Interim findings related to climate change
Sungai Penchala River Education Programme	Sungai Kinta River Education Programme was funded by G.A.B Foundation to empower Malaysians to make the choice to conserve the water sources.	x. GEC – Assessment on peatlands, biodiversity and climate change-executive summary
Community-based Waste Management in Pulau Pangkor	A 3-year project focussed on empowering local community to reduce coastal water pollution by managing waste and water sustainably via Waste to Wealth concept. The initiative was implemented by GEC, funded by Vale in Malaysia and supported by Department of Irrigation and Drainage, Manjung, Perak.	y. ASEAN and GEC – ASEAN Peatland Management Strategy z. ASEAN and GEC – ASEAN Peatland Management Initiative aa. ASEAN Peatland Forests Project (APFP) – Rehabilitation and Sustainable Use of Peatlands Forests Southeast Asia bb. GEC - Peatland Forest Ranger Module
The W.A.T.E.R project by SPARK Foundation	The W.A.T.E.R project by SPARK Foundation, in partnership with Global Environment Centre (GEC) was commenced in December 2007. W.A.T.E.R is a pioneer initiative to educate the public about the importance of water and why and how we should conserve and protect its sources, i.e. the rivers.	cc. GEC – Hutan Paya Laut Manjung Selatan – Southern Manjung Mangrove, Kampung Nelayan, Fishing Village dd. GEC – River of Life Segregate Solid Waste ee. GEC – River of Life -Public Outreach Programme Phase 5 ff. GEC – River of Life Public Outreach Programme
HSBC Water Conservation and Environmental Programme for Schools in Malaysia	Water Conservation Programme was a two-year project funded by HSBC Bank Malaysia Berhad to educate student on wise management of the water resources.	gg. GEC – 2017 Bunting on Local Community GEC – 2017 Bunting on Academic Institute hh. GEC – 2017 Bunting on Solid Waste ii. GEC – 2017 Industy's Solid waste
Community Flood-Proofing and Adaptation for Climate Resilience	Malaysian Water Partnership (MyWP) under the Global World Partnership (GWP) aims to create a platform and pathway to the community to be flood-proofing and adapt for climate resilience. Global Environment Centre has been entrusted as a working partner to implement this activity.	jj. GEC – Bunting on Best Environmental Management Practices: What we can do kk. GEC – Bunting River of Life "Communities' Activities" ll. GEC pamphlet – mm. Friends of Kuala Gula Mangrove Forest
River of Life Public Outreach Programme (www.myrol.my)	The main objective of ROL-POP is to generate evidential improvement in attitudes and behaviours of target groups within the Project Area towards river care and preservation in order to improve water quality and reduce pollution within project area. Other than that, it is to promote a sense of ownership towards the river and initiating long term and sustainable change in behaviour towards preserving the river.	nn. GEC – River of Life Public Outreach Programme oo. GEC – pp. friends of Selangor Peat Forest qq. GEC pamphlet – Mangrove South Manjung, GEC Poster - Water Saving Tips rr. GEC Poster – River of Life –Public Outreach Programme (POP) ss. GEC Poster – 4R, 2C way of life
Rehabilitation of Kelana Jaya Lakes, Selangor	The Kelana Jaya Lakes Rehabilitation Programme was developed in 2002 by Global Environment Centre (GEC) with funding from the UNDP-GEF Small Grant	

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continued

Project	Details	Module Developed
	Fund. The goal of the project was "to rehabilitate and sustainably manage the lakes of Kelana Jaya Municipal Park through participatory approach involving all key stakeholders, especially the community groups".	
Community Involvement in Conservation of Biodiversity of Sg Nenggiri basin, Kelantan	The Nenggiri River Conservation Programme (NRCP) was established in 2004 following concerns expressed by the local community and other stakeholders over the degradation of Nenggiri River and loss of livelihood from fishing and other natural resource-based activities. NRCP was established by the Global Environment Centre and Titiwangsa Heritage Sdn. Bhd. in partnership with local communities and the Kelantan State Government.	
Sg Pinang River Care programme	Sg. Pinang RIVER Care Programme which is a three-year project funded by HSBC Bank Malaysia Berhad in partnership with Global Environment Centre (GEC) to enhance community's participation in river protection and river rehabilitation ends in 2013.	
Rapid Assessment of Upper Kinta Catchment	A one-year project to provide baseline data on the upper Kinta catchment	
Community Flood-Proofing and Adaptation for Climate Resilience, Kuantan, Pahang	A short-term project, funded by University Putra Malaysia (UPM) to enhance and develop training module for community flood awareness and preparedness, incorporating experiential learning styles, to enhance climate change resilience. The project was implemented in partnership with GEC, MyWP and DID Pahang.	

c. National River Trail Programme

The National River Trail Programme (DSK) is one of the initiatives implemented by the Ministry of Environment and Water (KASA) to change the image of industrial factories in the country as river polluters in the eyes of the people. KASA has targeted 10000 km of trails in selected river areas by 2030. This programme is a strategic partner programme with district officials, local authorities, DID, NGOs, community and industry. The existence of trails along rivers or bodies of water will encourage environmentally based activities, such as picnics, fishing and cycling in the local community, thus preventing irresponsible parties from making the river as an eventual waste disposal site causing pollution. This programme is a good example of platform for public participation.

d. Wakaf Air

The Wakaf Air Fund is an initiative of KASA in collaboration with YWM aimed at providing alternative sources of funding for water service projects easily, quickly, and sustainably through endowment instruments. Wakaf Air provides a platform for the public, corporate and private sectors to participate based on their respective

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abilities in the Government's efforts to provide water services to those in need across religious, racial, and ethnic boundaries. Wakaf Air is a structured scheme to enable the public to perform wakaf in the water services sector which is very important in human life.

The initial stage usage of Wakaf Air funds is to fund small-scale water service projects worth below RM50,000.00 such as well excavation, maintenance, and purchase of spare parts to continue the supply of clean water and the provision of alternative water sources. This wakaf contribution can be channeled through the Malaysian Cash Wakaf System which can be accessed through the link https://www.ywm.gov.my/wakaf-air. Each contribution is eligible for income tax deduction under Section 44 (11C) of the Income Tax Act 1967, subject to the deduction that can be claimed by the individual is 7% and the company 10% of the aggregate income in accordance with the approval of the Ministry of Finance Malaysia [No. Tax Reference: (8.09) 248/40/7-2078 (29) dated 17 July 2019.

e. Friends of River (FoR)

According to Friends of River Malaysia, total of 145 Friends of river were established nationwide. In Selangor, the State Executive Council (EXCO) or Majlis Mesyuarat Kerajaan Negeri (MMKN) Selangor on 25 January 2019 has approved the establishment of the river's conservation implementation chaired by the chairman of the standing committee on infrastructure and public facilities and the board as the secretariat. Selangor government has approved a budget of RM1 Million as an effort to support Friends of River programme in 2021. One of the river conservation initiatives introduced through this committee is the creation of Friends of River (FoR) in the State of Selangor.

The objectives of Friends of River (FoR) are:

1. To increase public awareness and love for the importance of rivers in the State of Selangor and the preservation of ecosystems.
2. Sense of ownership and accountability amongst the community towards the river.
3. Collaborate with the local community in implementing river conservation programmes/activities consistently.
4. Creating a clean, lively, and safe river environment to visit.

Meanwhile, 19 community-based platforms have been established and platforms are listed below in **Table 7.4**:

Table 7.4: Friends of river in Selangor (under LUAS)

No	Community Name	Community Leader	Name of River
1	Friends Sungai Klang Taman Melawati River	Kennedy Michael	Sungai Klang
2	Friends of Klang River Basin	Kalithasan K.	Lembangan Sg. Klang
3	Inspirasi Kawa and Water Warriors	Affan Nasaruddin	Sungai Selangor
4	Belia Patriot YPNM	Lt. Kol. Bersekutu (PA) Hj. Yann Razal	Taman Warisan Hulu Sg. Klang
5	JKP Zon 4 MPSJ	Ar Kamarul Hisham Bin Hj. Yeop Hashim	Sungai Klang

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continued

No	Community Name	Community Leader	Name of River
6	Inspirasi Kawa	Masbudi Abdul Malek	Sungai Selangor
7	Friends of Sg. Garing	Samsudin Bin Mohamad	Sungai Garing
8	Taman Rekreasi Paya Bakau Kg. Sijangkang	Mohd Suhaimi Bin Sanusi	Sungai Batu 8 Sijangkang
9	MPKK Kg. Melayu Bt. 16, Rawang	Adnan Bin Ahmad	Sungai Sepakat
10	Kelab Kebun Rumah Pangsa AU2	Tn. Haji Mohamad Halim Bin Mohamad Said	Sungai Klang
11	Kampung Taman Warisan	Mazelan Bin Jamaluddin	Sungai Klang
12	Kelab Rekreasi Sirip Biru Negeri Selangor	Zaidi Bin Ahmat at Haron	Sungai Sepang Besar
13	Komuniti Bestari Jaya	Zaleha Mat Saat	ORS Bestari Jaya
14	River4life	Airudin Bin Saranor	Sg. Alor Lempah
15	Kelab Rotary Malaysia	Dr. Dhileepan	Sungai Selangor
16	Desa Anggerik Serendah	Dr. Ir. Mohamad Asari Bin Daud	Sungai Selaru
17	MPKK Sungai Apong	Mohd Shahrazad Bin Abd Ghani	Sungai Apong
18	Friends of Rivers, Malaysia	Dato Seri Zaini Ujang/ Mansor Abd Ghani	Sungai seMalaysia/Friends of River Malaysia
19	Indah Water Konsortium	Indah Water Konsortium (Shah Alam)	Anak Sungai Tambul Kota Damansara
			Anak Sungai Bukit Gasing, Petaling Jaya
			Desa Mentari, Petaling Jaya
			Tasik Seksyen 7, Shah Alam
			Sungai Langat (Kawasan Perdagangan Banting)
			Sungai Kanching, Templer
			Sungai Air Hitam/Parit Besar, Seksyen 4, Bandar Baru Bangi
			Sungai Air Hitam Tributary, Klang

By recognising the successful experiences on water management in Malaysia, it is crucial to enhance public participation in water management of Malaysia to ensure a successful route towards the Water Sector Transformation 2040. Therefore, AACB Sub-Sector has adopted the public participatory process (PPP) in this study and strive towards the establishment of a national platform for awareness raising, advocacy and capacity building of all relevant stakeholders to improve their willingness to participate in water resources management in Malaysia.

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7.1 Quadruple Helix Stakeholders

In supporting the 12th MP, it is very crucial in empowering people, comprehensive Awareness, Advocacy and Capacity-Building Programmes were introduced. Effort to enhance understanding of the IWRM at all levels need to be intensified through the implementation of comprehensive AACB programmes. Adopting the 'Business Unusual' approach, the AACB Sub-Sector is developing AACB IWRM Training Modules for the quadruple helix of stakeholders, namely: 1) Community, 2) Academia, 3) Business/Industry, and 4) Government; written by the Module Cluster Leaders (MCLs) from the Universiti Kebangsaan Malaysia (The National University of Malaysia; UKM).

The quadruple helix model can be seen as an enhancement of the triple helix perspective that not only focusses on the actors from academia, government, and industry, but also recognises the increased role of the community (Hasche et al., 2020; Värmland County Administrative Board, n.d.). The Quadruple Helix Stakeholder model shown in below **Figure 7.8**. Based on the model, AACB has identified the targeted stakeholders based on the Quadruple Helix model as shown in **Figure 7.9**.

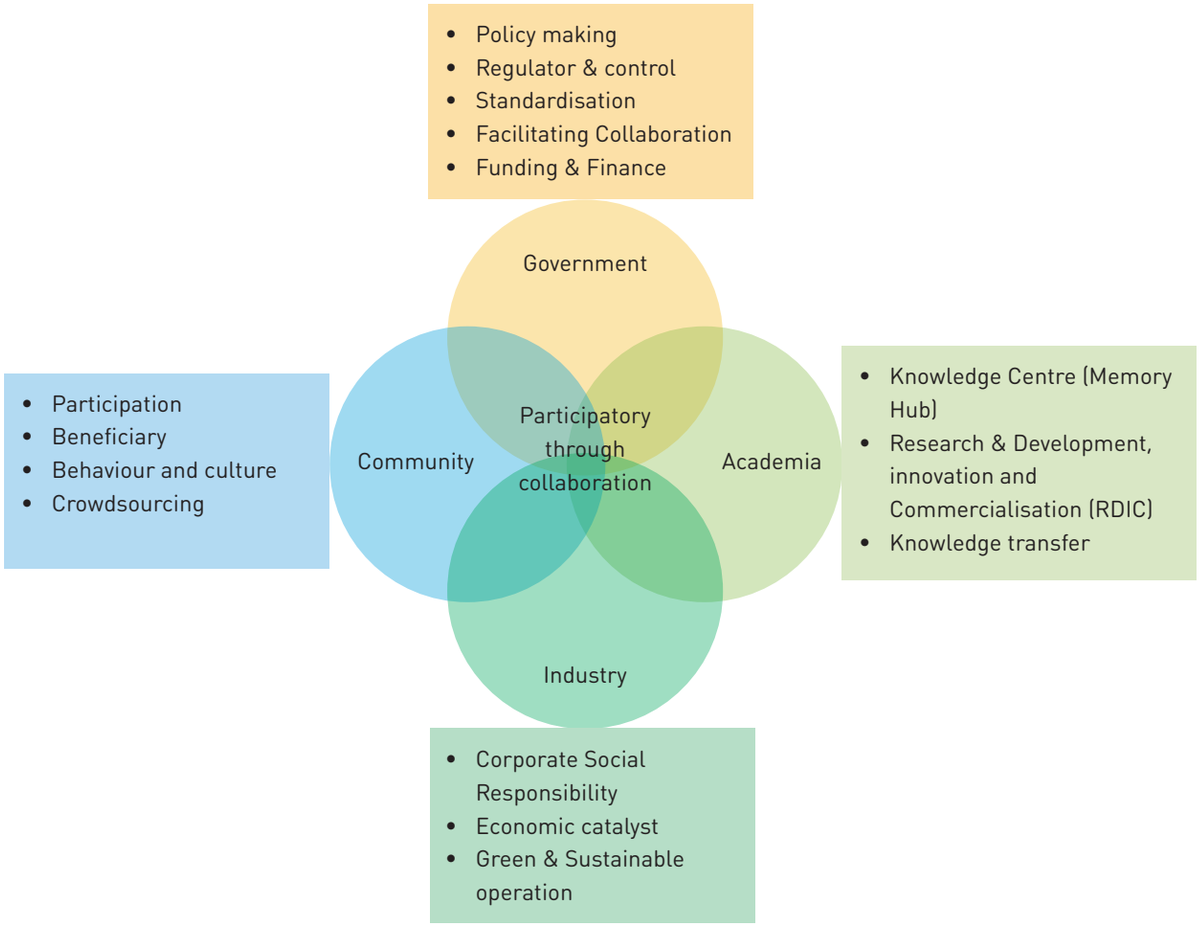


Figure 7.8: Quadruple Helix Stakeholder model

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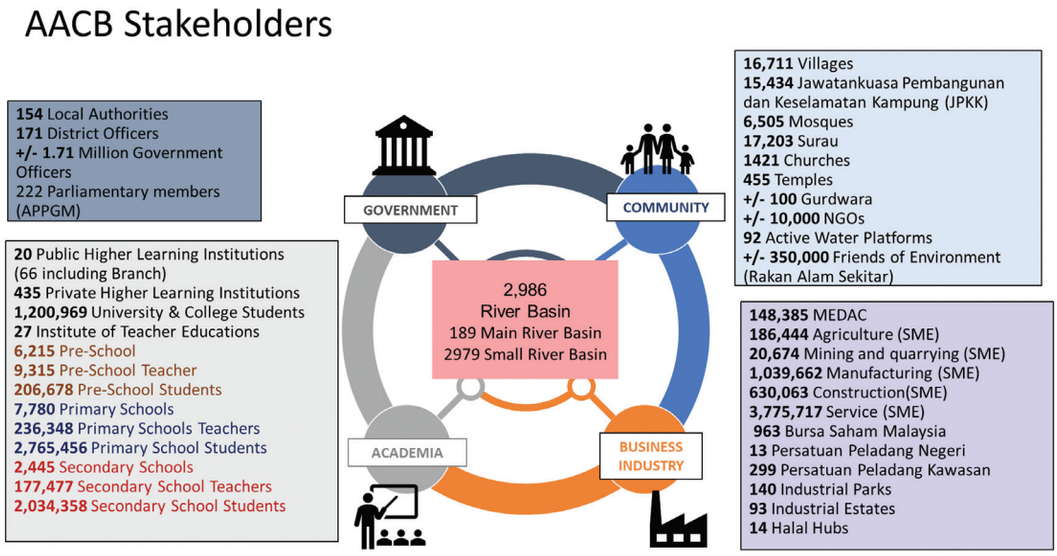


Figure 7.9: AACB Quadruple Helix Stakeholder

AACB has established 4 clusters, namely Government Cluster, Business & Industry Cluster, Community Cluster, and Academia Cluster. The roadmap of AACB WST2040 has been proposed based on the clusters, respectively. AACB Sub-Sector focussed on SMART capacity building programme where targeted on producing advocator for each quadruple helix stakeholders. The target advocator for each cluster as stated in **Table 7.5** below:

Table 7.5: AACB proposed target advocators by cluster

Malaysian Plan / AACB Clusters	12th MP	13th MP	14th MP	15th MP
Advocators	(2022-2025)	(2026-2030)	(2031-2035)	(2036-2040)
Government	**RM13,291,251,900**	**RM4,209,881,247**	**RM4,209,881,247**	**RM4,209,881,247**
Civil Servants (CS) **Local Govt.** **State Govt.** **Federal Govt.**	1,792,440 CS	570,567 CS	570,567 CS	570,567 CS
Academia	**RM250,400** **RM1,057,850**	**RM500,800** **RM2,115,700**	**RM751,300** **RM3,173,550**	**RM1,001,800** **RM4,231,400**
Lecturers (L) Teachers(T)	2,504 (L) 21,157 (T)	5,008 (L) 42,314 (T)	7,513 (L) 63,471 (T)	10,018 (L) 84,628 (T)
Business	**RM360,000**	**RM496,000**	**RM496,000**	**RM496,000**
Business Representatives (BR)	740 BR	1,240 BR	1,240 BR	1,240 BR
Community	**RM7,670,000**	**RM15,300,000**	**RM30,600,000**	**RM61,200,000**
Community Leaders & ENGOs (CL & ENGOs)	1,500 CL & ENGOs	3,000 CL & ENGOs	6,000 CL & ENGOs	12,000 CL & ENGOs
Total	**RM44,013,250**	**RM68,062,500**	**RM86,070,850**	**RM122,430,240**

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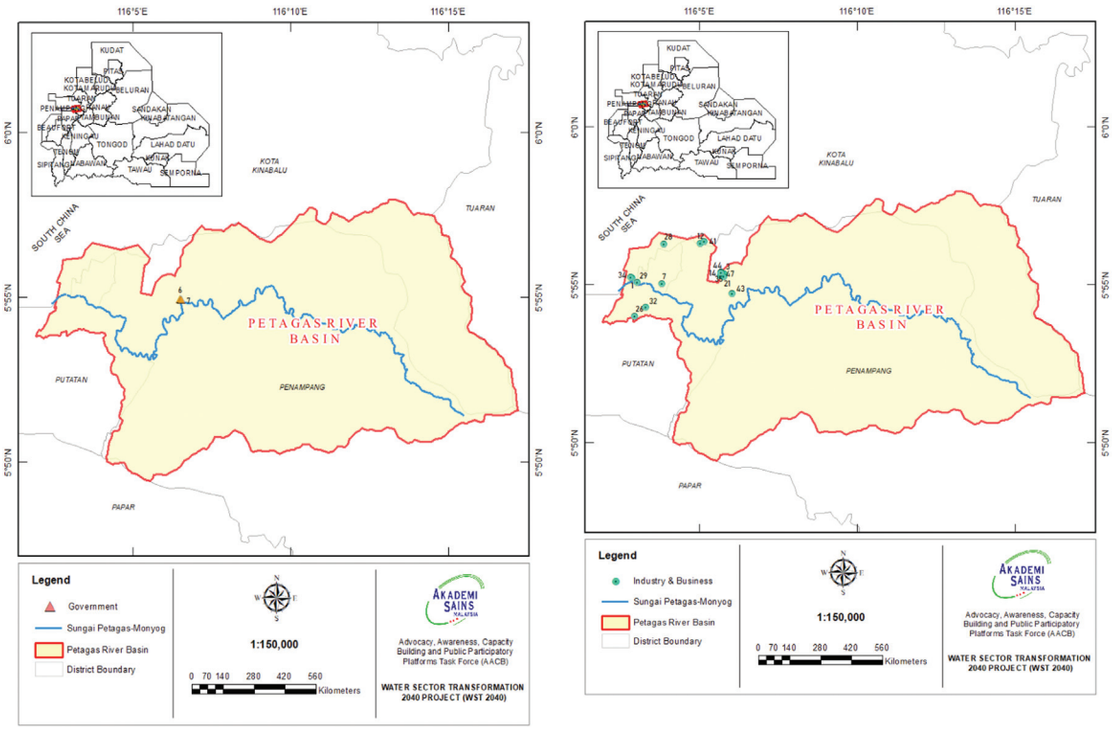
7.2 Strategies to attract people to IWRM

The application or implementation of IWRM principles does not always need an immense resource; sometimes, it can start with a small group of selected local government, community, businesses and industry, and academia. However, developing and engaging stakeholders to IWRM can be challenging, especially at the local level, where the capacities may be limited. Hence, proper strategies are needed to enhance awareness, advocacy, and capacity building of government officers and industries to protect water resources and river basins.

The WST2040 Final Report Harmonisation Workshop on 28 October 2021 highlighted one of the reasons for the failure of IWRM as a course at any local university as the lack of interest. Because of that, the AACB Sub-Sector wants to suggest a few strategies to attract people towards IWRM. It suggests INTAN incorporate the government and academic training modules in their curriculum. Meanwhile, the Business and Industry AACB Module Training becomes a must for businesses and industries prior their license application. They also need to submit yearly reports to Bursa Malaysia as part of their CSR.

As a community, we are living in a river basin that catch rainwater in the headwater, which later form river tributaries, and ends up in a river channel. A river basin may consist of a district, several districts or even states. In this study, AACB Sub-Sector has plotted out the quadruple helix stakeholders at three river basins such as Muda River Basin, Baram River Basin and Petagas river to show our life revolves around the river basin. Rivers provide our communities with economic, ecological, and cultural value. Since water runs throughout a drainage basin either as surface or sub-surface flow to eventually form the network of channels which is the river system, any changes in land or water use within the basin are rapidly reflected in the river. The river might be flowing nearby your house, workplace, schools and others. Based on these diagrams, we can see the proximity of our life lingers around river basin whether we realise it or not.

PETAGAS RIVER, SABAH



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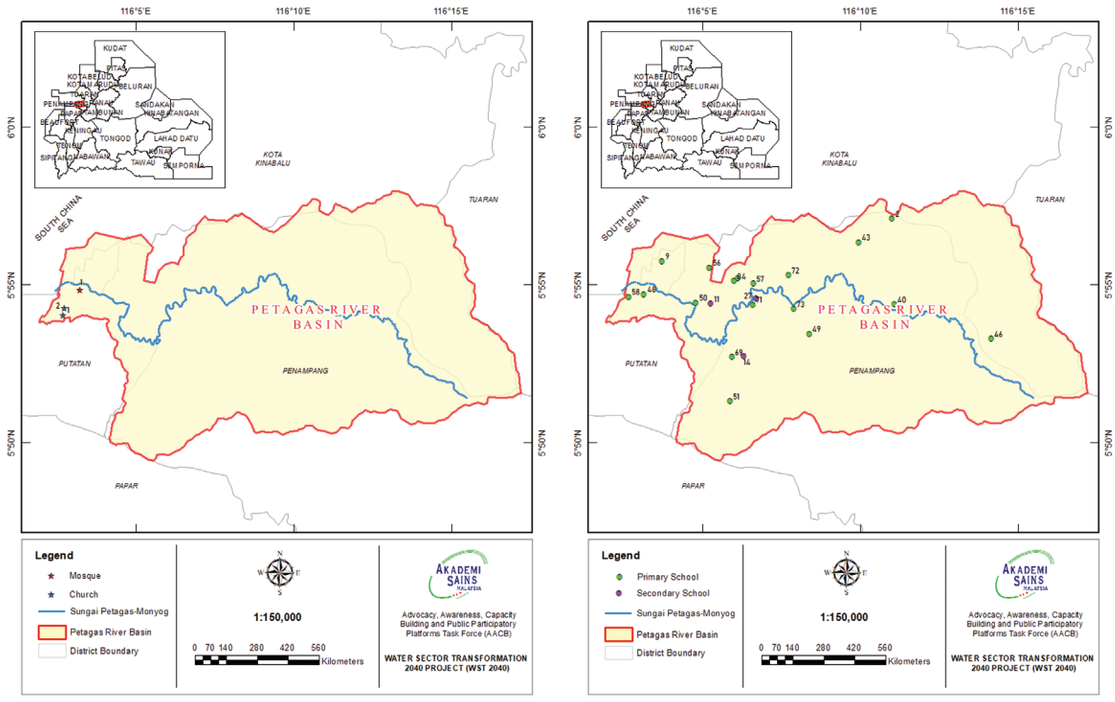
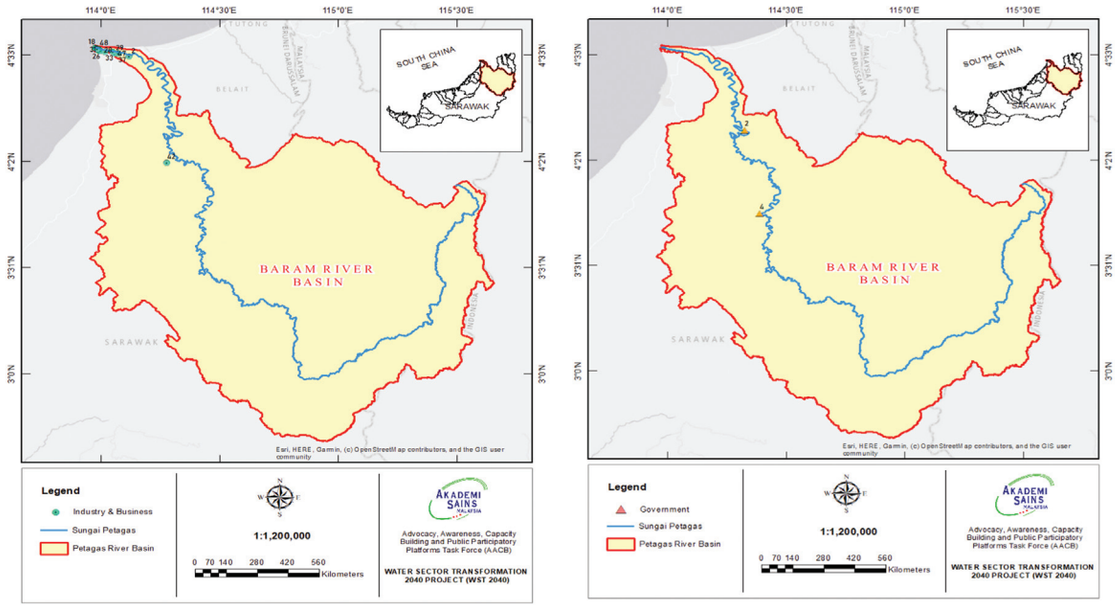


Figure 7.10: Location of Quadruple Helix Stakeholders at Sungai Petagas

BARAM RIVER BASIN, SARAWAK



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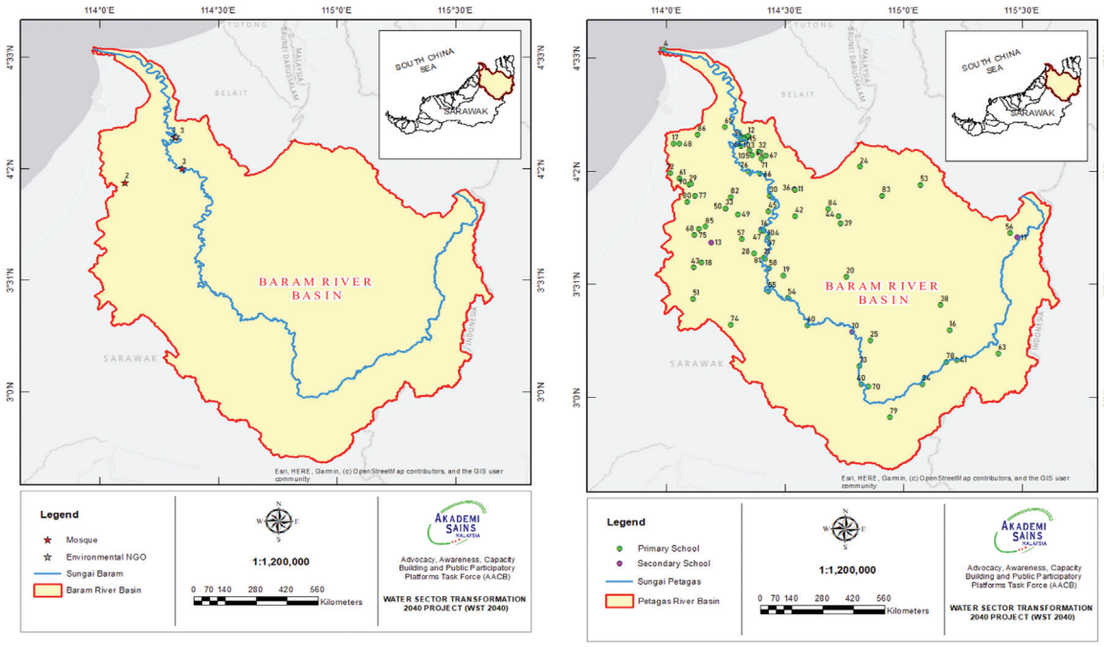
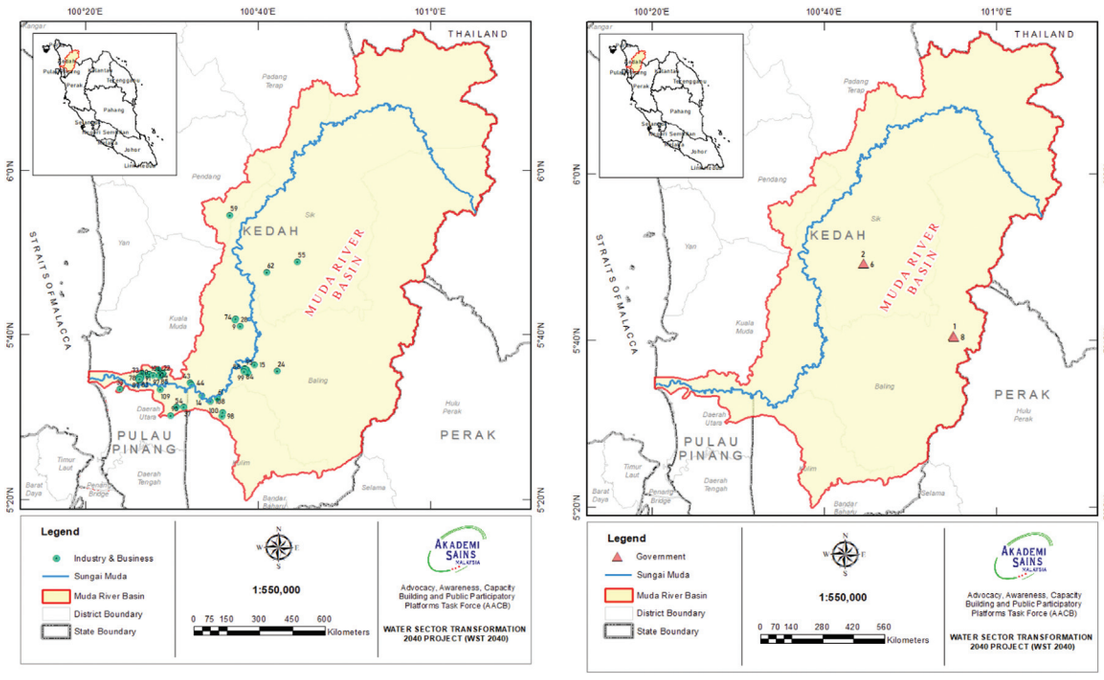


Figure 7.11: Location of Quadruple Helix Stakeholders at Baram River Basin, Sarawak

MUDA RIVER BASIN, KEDAH



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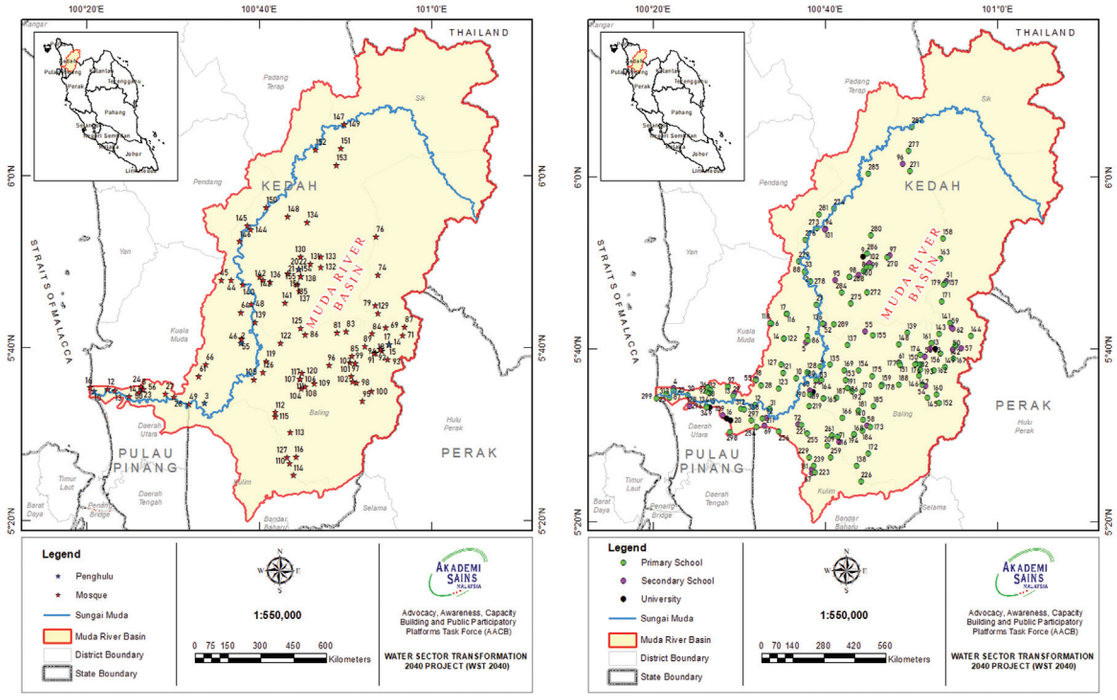


Figure 7.12: Location of Quadruple Helix Stakeholders at Muda River Basin, Kedah

AACB task force uses the quadruple helix model, a partnership model that builds and interact innovatively between the four actors, in this case the government, academia, industry and community, to achieve WST2040 goals. From this study, AACB has designed strategic training modules to empower the targeted clusters on water-related knowledge, communications and leadership roles. The Clusters, chosen for their strong societal influence, are the government sector, business and industry, academia and community.

These training modules are expected to trigger positive behavioural changes towards water for the next 20 years through the 12th, 13th, 14th and 15th Malaysian Plan. Ultimately, AACB aims to bring people closer to water, not physically but to rekindle the strong relationship we once had with rivers, river basins and their general environment.

7.3 The Importance of Leadership Roles: Government Sector

Dr. Minhaz Farid Ahmed, Prof Dato' Dr. ChM. Mazlin Mokhtar and Nurul Ain Binti Sazalli

7.3.1 Background

The leadership roles of government sector for integrated water resources management (IWRM), especially at the developing countries are very important. However, public participation or community participation in integrated water resources management programme are always challenged by the public's poor level of knowledge, by their reluctance to participate as well as by the lack of an organised platform (Rault et al., 2013). Several studies, however, have reported potential willingness on the part of the public to participate in water management, especially in the higher water stress countries (Bjerregaard, 1998; Carr et al., 2012; De Marchi, 2003). Rault et al. (2013) also reported active potential participation of the public, even in the limited number of democratic countries, through expressing and exchanging views and opinions of their surroundings

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instead of communicating through any media. Therefore, people would have sufficient knowledge of water management problems both at the institutional and household levels.

In Malaysia, the Academy of Sciences Malaysia (ASM) has produced the 'National Integrated Water Resources Management Plan' (2016) in line with the 11th MP (2016–2020), Integrated Water Resources Management (IWRM), Integrated River Basin Management (IRBM), Integrated Lake Basin Management (ILBM), and others. Moreover, the Malaysia Industry-Government Group for High Technology (MIGHT) was established to promote public-private partnerships for sustainable development, including the management of water resources. All these approaches, including the approach of Sustainable Development Solutions Network (SDSN), are trying to involve civil society and local authorities in sustainable water resources management to achieve the SDGs (Sustainable Development Goals), especially SDG target 6.5, which aims to implement integrated water resources management at all levels, and SDG target 17.17, whose goal is to strengthen public, private, academia, NGO and civil society partnerships (Ahmed et al., 2020).

Several studies have claimed that people's attitudes towards and perceptions of water resources are reflected in the government's water resources management programme as people's intentions are the necessary ingredients for political will and action (Burstein, 2010; Stoutenborough & Vedlitz, 2013). Therefore, when they reflect people's perceptions and attitudes in the relevant water management programme, then there will be a healthy and positive relationship between people's perceptions and attitudes as well as their willingness to engage in water resources management. Lai et al. (2017) reported that educating people is very important and essential to reduce the non-revenue water (NRW) tariff on water resources management in Malaysia.

Although the government is looking for the NRW tariff reduction, education can make people aware of engaging in water resources management and can also promote their interests to reduce the NRW tariff. Accordingly, prediction and control approaches were used as an instrument to manage water resources for a quite long time, especially the management dominated by engineering solutions, such as supply water management through pipeline distribution. However, pollution control should address both the point and non-point sources of pollution including the land-use changes especially for rapid development activities (Pahl-Wostl et al., 2008). Therefore, sustainable and integrated water resources management require societal search and learning processes for the inclusion of both infrastructural and non-infrastructural measures (Pahl-Wostl, 2002). Therefore, understanding the total ecosystem management by the local government is very important towards contributing sustainable development including the IWRM. In this regard, the world-famous medical journal 'The Lancet' has come out with a remarkable Planetary Health Infographics 'Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health' (**Figure 7.13**).

In Malaysia, the shortcomings in sustainable water resources management are reported mainly because of inadequate enforcement of laws, lack of public participation, along with an inadequate emphasis on non-structural measures (Chan, 2009, 2012; Mokhtar et al., 2010, 2011). Moreover, the transboundary pollution of the Langat River mainly from the sewerage and industrial discharges, agricultural runoff and such has been reported by several studies even though the river is one of the prime sources of drinking water in the Selangor State, Malaysia (Ahmed et al., 2020, 2018a, 2018b). Therefore, public engagement with the government, non-government, academia and business sectors could be effective in water resources management (Chan, 2012; Mokhtar et al., 2011). Although there are a few studies in Malaysia concerning public perceptions and involvement in integrated water resources management based on the statistical analysis (Ab Razak et al., 2015; Afroz et al., 2016; Lai et al., 2017), however, Ahmed et al. (2020) reported that public's perception of

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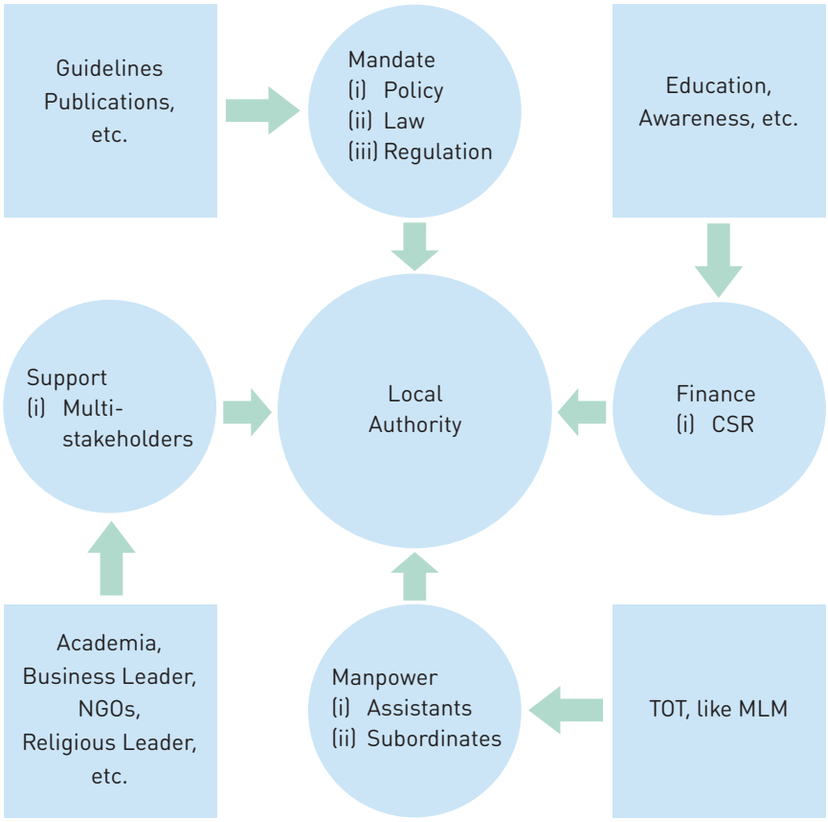
Source: The Lancet, 2015

Figure 7.13: Understanding Planetary Health will also contribute in total Ecosystem Management including Water

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and attitude towards river and drinking water as well as their perceived water quality were found to be the significant indicators influencing their participation in water management platforms.

Therefore, the responsible authorities in Malaysia should focus on raising awareness, advocacy and capacity building for people's effective participation in water resources management. For instance, the National Water Resources Policy 2012, the Water Services Industry Act 2006, the Environmental Quality Act 1974, and others mainly focus on raising awareness. However, advocacy and capacity building of the stakeholders in water management are not highlighted significantly in the policies and acts. Therefore, the agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform. The pro-active and effective leadership of Local Authority is an urgent requirement for an integrated and holistic water management along with safe and available drinking water supply to the household level. To be pro-active four elements (i.e., mandate, finance, manpower and support) are required for the Local Authorities (**Figure 7.14**). Meanwhile, Local Authorities have the full mandate to manage non-point sources pollution in Malaysia which will assist in ensuring safe drinking water in Malaysia. Finance and manpower are also very important for the Local Authorities, but the finance is not adequate as well as there is lack of training of the lowest rank officials to enhance multitasking capability in taking leadership roles for IWRM. Moreover, the inadequate support from the multi stakeholders are the major problems to manage the river. However, Local Authorities/district officials could be better in arranging multi stakeholders' platform as well as networking with public, private, NGO and civil sectors in managing and monitoring the quality and quantity of raw as well as drinking water (Ahmed et al. 2018a).

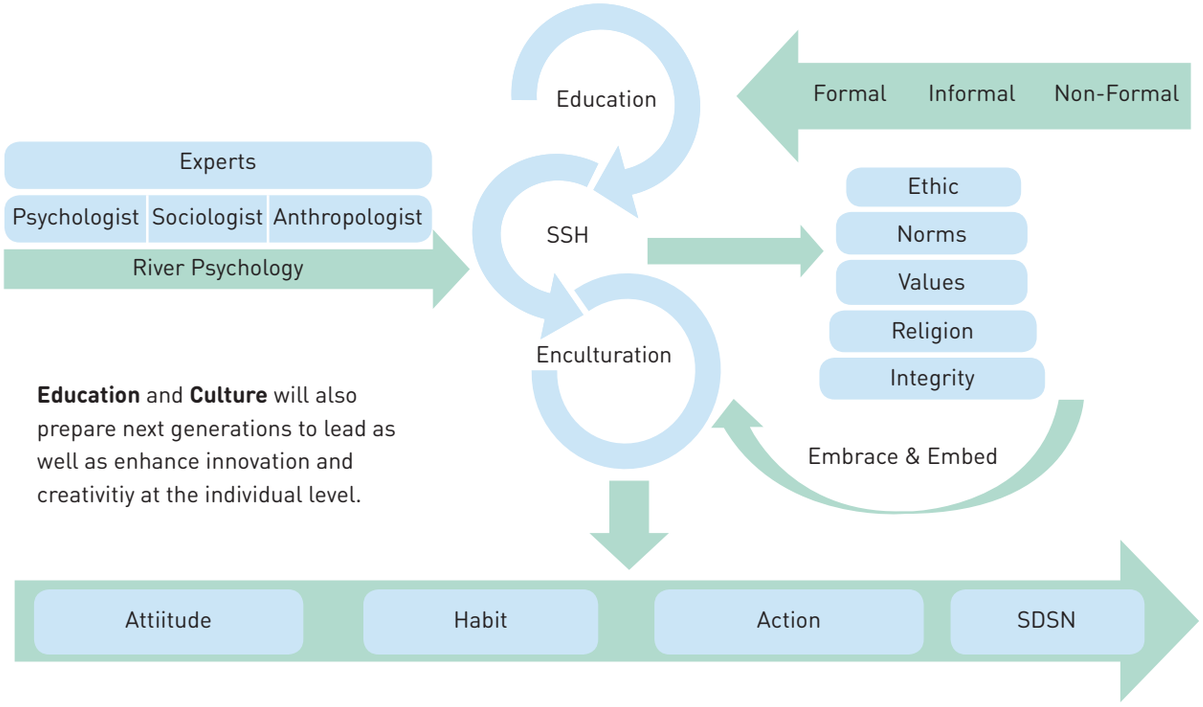


Source: Ahmed et al., 2018a

Figure 7.14: Elements needed for the Proactive Leadership Roles by the Local Authority

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Local Authorities should be recognised to lead and control other stakeholders. Leadership in both top-down and bottom-up approaches might solve the implementation problems since Local Authorities and District Offices are the lowest government administrative institute at local level. Engagement and participation of all stakeholders will contribute to enhance the leadership skill of Local Authority and/or individuals. Moreover, education (i.e., formal, informal, non-formal) and culture will also prepare next generations in taking leadership as well as enhance innovation and creativity at the individual level (**Figure 7.15**) (Ahmed et al., 2018a).

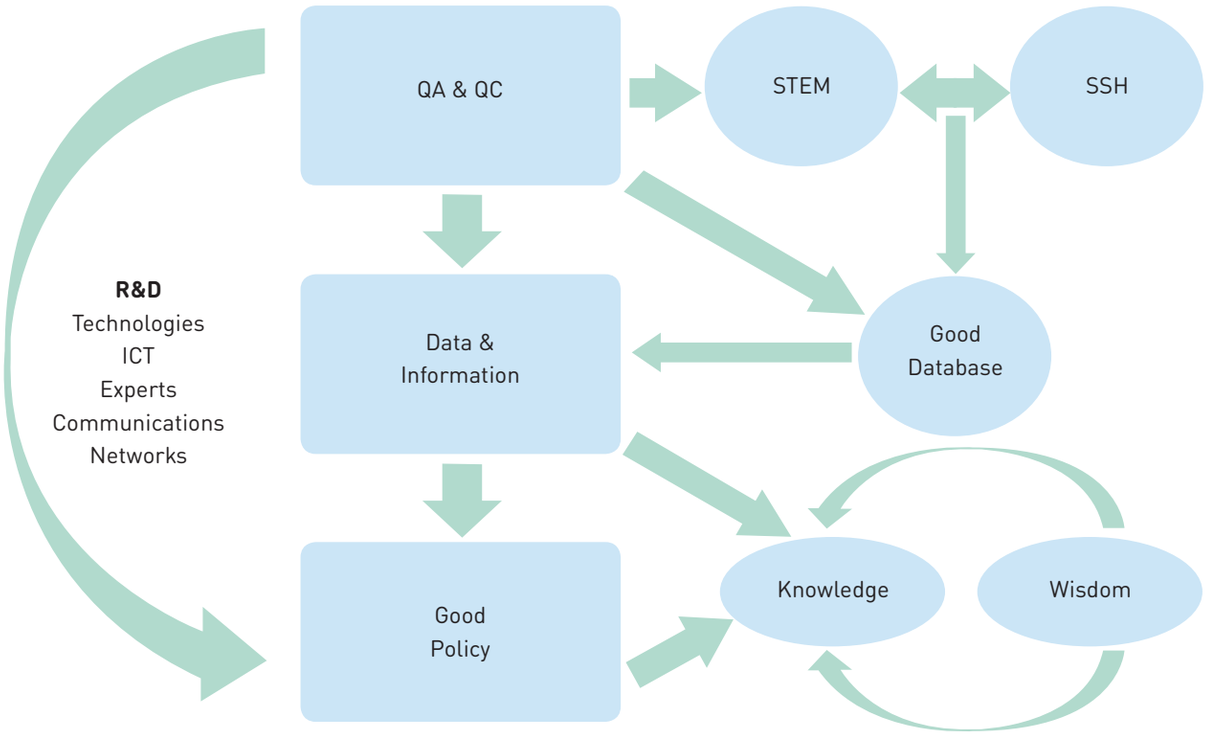


Source: Ahmed et al., 2018a

Figure 7.15: Stewardship towards IWRM via effective Multi-Stakeholder's Platform

Moreover, quality data and information are very vital for the policy makers as well as researchers to produce better policies and modification of existing policies and guidelines. Hence, quality assurance (QA) and quality control (QC) of science, technology, engineering and mathematics (STEM) data as well as social science and humanities (SSH) data will help to produce better policy as well as updating existing policies through good database (**Figure 7.16**). Moreover, QA and QC at many levels will ensure precision and accuracy of data and information for effective decision-making processes by the local authorities. Hence, the local authorities as well as the individual will get the best authentic knowledge which will influence and inspire them to act well and to take leadership in doing good things through using their wisdom (Ahmed et al., 2018a).

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Source: Ahmed et al., 2018a

Figure 7.16: Data and Information to produce Good Policy and to take effective Decision.

People in Malaysia are aware of the importance of water quality not only for aquatic life but also for a healthy and high-quality standard of living. They also think that quality water is an essential requirement for economic development. They are willing to participate in water resources management if they are well informed about the benefits of better water quality. Hence, education and awareness-raising activities should be advocated by the appropriate agencies to increase the number of people participating in a water resources management programme. People also think that the effective implementation of policies is required for water management. Although there are many sound policies in Malaysia for water resources management, the promotion and enforcement of these policies are a big challenge and might be due to low participation on the part of relevant stakeholders and inadequate leadership roles from the relevant agencies. Hence, an effective multi-stakeholder's platform for water resources management that would be useful for meaningful participation in a management programme along with government, non-government, civil society, academic and business entities. Therefore, the local authorities can take proactive leadership roles because they have the power of enforcement via the Local Government Act of 1976 to change the mindset of people about the importance of water management through special training, campaigns, etc. Special training is also required for the training of the trainers (TOT) to enhance their capacity building in water resources management. Thus, campaigns and public meetings are useful tools for active participation of people in natural resources management, and their participation can contribute significantly to sustainable water resources management (Ahmed et al., 2020). Hence, the government sector should highly be focussed on five focus areas to accelerate the implementation of IWRM in Malaysia (**Figure 7.17**).

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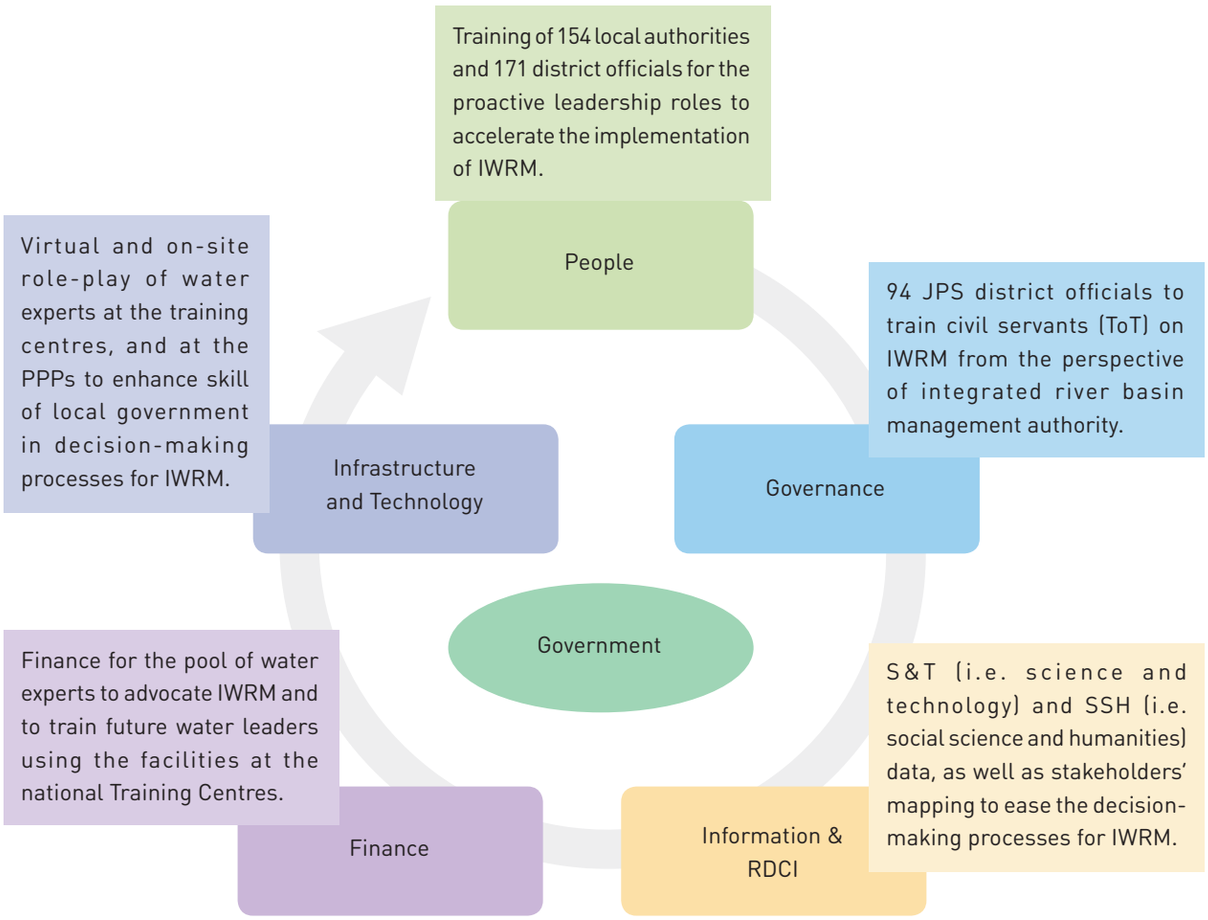


Figure 7.17: Focus Areas for Government Sector in AACB and PPPs WST2040

7.3.2 Stakeholder's Engagement for Government Cluster

A total of 13 stakeholders' engagement has been conducted as details in **Table 7.6** below:

Table 7.6: List of Stakeholder's engagement for Government Cluster

Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
Activities related to Environmental Sustainability Awareness (Clean Water& (Clean Water Sewerage) By SPAN throughout 2020 (Until 17 November 2020)	23 November 2020	Softcopy/Online	- List of activities on awareness programmes for sustainable environment and Sewerage) such as: • Non-revenue water reduction campaign • Sustainable clean water campaign • Sustainable environment campaign • Enforcement activities (stolen water) • Stop river pollution campaign • Water pollution at source dialogue • Video campaign: save water • Video campaign: climate change effect • Radio campaign – SPAN role • Workshop on enforcement under Act 655 and anti-corruption programme

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
Input from Department of Environment for the Development Study of the National Agenda Roadmap for the Water Sector Transformation 2040 (WST2040)	9 December 2020	Softcopy/Online	Obtained input on: - List of training (capacity building) related to water management for civil servants in the Department of Environment according to position. - Training modules related to water management, especially the training module of the Environment Institute of Malaysia (EiMAS) - Awareness and advocacy activities and programmes related to water management conducted by the Department of Environment.
Inputs for the National Agenda Roadmap Development Study for the Water Sector Transformation (WST2040) by the National Water Research Institute of Malaysia (NAHRIM)	23 December 2020	Softcopy/Online	Obtained input on: - List of training (Capacity Building) in Water Management in NAHRIM (2015-2020) - Training Module for Water Management at NAHRIM (2015-2020) - Advocacy Activities related to Water Management at NAHRIM (2015-2020) - Other information related to Water Management
Pembangunan Modal Insan Division Department of Irrigation and Drainage Malaysia Participants: 1. Mr. Poh Chee Chin (Seksyen Pembangunan Latihan Bahagian Pembangunan Modal Insan, JPS) 2. Dr. Zuritah A. Kadir (ASM) 3. Nurul Ain Sazalli (ASM)	7 January 2021	Physical	- JPS training courses are more on technical courses - Modul training obtained from JPS 1. List of DID 2015-2020 scheduled course modules 2. List of scheduled courses modules for the year 2021 DID
Webinar on "Training Module for Government Officials to Accelerate the Implementation of IWRM" Participants: 1. Siti Hawa (MOHE) 2. Hareeharan Mathialagan (ASM) 3. Harris Haikal 4. Go Wen Ze (ASM) 5. Nuratikah (UKM) 6. Nurul Iman (ASM) 7. Daria Mathew (WWF) 8. Kalithasan (GEC) 9. Brian Cracknell (Languageworks)	12 January 2021	Online	- Issues and Challenges in Implementing IWRM • Administrative, Management and Technical Issues • Obstacles and Challenges • Community Participation (Ownership, sustainability) • Financial Support (Government, Private, others) • Climate Change Impact • Federal-State jurisdiction on IWRM - Role and Involvement of Administrators in IWRM

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
10. Siti Nurhayati (ASM) 11. Haslawati (DOF) 12. Vinita (GEC) 13. UPEN Kelantan 14. Ir. Mukhlis (MADA) 15. Hanif 16. Dr. Wan Aishah (MOHE) 17. Aida (ASM) 18 Alwin Long (A technologies) 19 Hanie (MOHE) 20 Azmizam (Urbanice) 21 Ashadi 22 Mohd Ismail Abd Aziz 23 Dr. Lee Khai Ern (UKM) 24 Siti Nurfazreen (ASM) 25 Murni 26 Nor Azalina (KPKT) 27 Anisah (SPAN) 28 Jagedeswari (GEC) 29 Prof. Sharifah Wan Ezat 30 Dr. Goh Choo Ta (UKM) 31 Nurul Hana (ASM) 32 Muhammad Irfan (ASM) 33 Dr. Zuritah A. Kadir (ASM) 34 Nurul Ain (ASM) 35 Ammielyya (ASM)			• Administrators at Federal Level • Administrators at State Level • Administrators at Local/District Level • To cover jurisdiction on the key IWRM Elements • Conflict of interest - Disaster risk management • Water governance – water and land are under state jurisdiction • Some states have Badan Kawal Selia Air, JPS (National Water Balance Management System) • Objections on some states on Rang Undang Undang Air • JPS Penang using the Penal code under Item 430 (Disturbance and interference of water resources for irrigation) because of pollutants die to pig farming - Issues on participation of fisherman: • sand-dredging • cage fish farming that does not meet DID standards - Specific Roles of Selected Agencies (Forestry, JKR, JAKOA) - SMART Partnership
Webinar on Dynamic Leadership Roles of Government Sector for Water Resources Management at Davao, Philippines with Dr. Anthony C. Sales (Corporate Secretary for HELP Davao Network) Participants 1. Saeidah Jaafar (Jabatan Kimia Malaysia) 2. Ritz Angelica Soriano (DOST, Philippines) 3. Jagedeswari (GEC) 4. Gladys Rio Arallano (DOST, Philippines) 5. Kwan Soo Chen 6. Mohd Izani (Forestry) 7. Johari (PAAB)	23 February 2021	Online	- Constrain for the IWRM activity on the school youth in Philippines • Allocations of budgets needed aside the political will • Capacity building for youth – concepts, principles translated into actions - The challenges the team encountered to include/increase the public participation from grassroot level & how do they handle them? • On how to convince and persuade people to get on board. In the framework, the component on sustainable livelihood. • Including indigenous livelihood and their marketability of their products.

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
8. Azmizam (Urbanice) 9. Nuratikah (UKM) 10. Kimberly (DOST, Philippines) 11. Mohd Jasri (PAAB) 12. Ruth Gamboa (Edu, Philippines) 13. Malarvilli (Jabatan Kimia Malaysia) 14. Muhammad Irfan (ASM) 15. Mayan Janne Inni (DOST, Philippines) 16. Zakiyyah Jasni (DOA) 17. Mohd Khairul Anwar 18. Normaliza Noordin (Ppj) 19. Yaashinni (DOA) 20. Sphen (DOST, Philippines) 21. Nema Freya (DOST, Philippines) 22. Nurul Hidayah (IWK) 23. Camilo (DOST, Philippines) 24. Mohd Fikry (MPOB) 25. Jazzle Jane (DOST, Philippines) 26. Della Grace (DOST, Philippines) 27. Jackie Chua (MPOB) 28. Nurul Iman (ASM) 29. Panitha (ASM) 30. Dr. Ab Saman (UTM)			• Engage the Pentahelix sectors in the earliest possible stage i.e., the conceptualisation stage including the communities, civil society. We invite the representative from the village people. - Communication with the stakeholders • Risk communication • Engagement with the media • Conduct an information page reaching out to the grassroot level • Engage with local authority - Payment for Ecosystem Services – study conducted on how willing people to pay for environmental services, the response is poor from the public, so the policy is put in place - Challenges for effective multi stakeholder platform for IWRM • Getting people on board • Sources of income for families in the communities • On the strategic plan for HELP Davao Network, sustainable livelihood and entrepreneurship of the communities
Discussion session for the National Agenda Roadmap Development Study for the Transformation Water Sector Transformation 2040 (WST2040) rganised by the Advocacy, Awareness, Capacity Building and Public Participatory Platform Task Force with the Department of Irrigation and Drainage Malaysia Participants: 1. Dr. Minhaz Fari Ahmed (UKM) 2. Dr. Rasyikah Khalid (UKM) 3. Dr. Zuritah A. Kadir (ASM) 4. Muhammad Irfan Masri (ASM) 5. Nurul Ain Sazalli (ASM) 6. Nurul Iman Abu Hanifah (ASM) 7. Siti Nurfazreen Abdul Rahman (ASM) 8. Prof Dato' Mazlin Mokhtar (UKM/ASM) 9. Dato Ir. Nor Hisham (JPS)	26 March 2021	Online	- The need on local authority helps for programmes involving the community, such as the 'Cintailah Sungai Kita' programme - Agency like JPS is more on technical but have no power on legal backing and enforcement - Simple pamphlet or booklet for the local/local government for easier understanding - How should we train the state and local government in IWRM – on water hazards - How can the government officials become more functional – following every measure of programmes, must have CEPA, and working for info centre, gallery on big projects, such as that collaboration with the tourism department, where people can have information on the projects, and also local business which have a bit of economy gain for the locals

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
Webinar on Safeguarding and Rehabilitating Malaysian Rivers Role and Responsibility of One and All with Department of Environment Participants: 1. Dr. Minhaz Farid Ahmed (UKM) 2. Prof. Dato' Mazlin Mokhtar (UKM/ASM) 3. Dr. Zuritah A. Kadir (ASM) 4. Dr. Norhazni (DOE) 5. Syazreen (DOE) 6. Nurul Ain Sazalli (DOE) 7. Safwan Sufi (UiTM) 8. JV (UiTM) 9. Muhammad Faeyzzul (UiTM) 10. Mohamad Khairul Azhar (Air Selangor) 11. Julina Sabran 12. Lubna Alam (UKM) 13. Yumarnis (Forestry) 14. Siti Nurfazreen (ASM) 15. Xingkang Tan 16. Dr. Lee Khai Ern (UKM) 17. Ngai Weng Chan (Water Watch Penang) 18. Chern Wern Hong (Water Watch Penang) 19. Carys Wong (WWF) 20. Nurul Anis (UiTM) 21. Julaihi (EPU Sarawak) 22. Siti Nadhirah 23. Saiedah Jaafar (Jabatan Kimia Malaysia) 24. Siti Umi Kalthum (IIUM) 25. Tee Hui Yong 26. Asrulsani Jambari (Wildlifeonplanet) 27. Mohd Khairol (Karya Alam Services) 28. Hanny Atasya (UiTM) 29. Rosnani (UiTM) 30. Dr. Goh Choo Ta (UKM) 31. Asief Sharai (UiTM) 32. Behzad Lee (UiTM) 33. Peter Kallang (SAVE Rivers) 34. Nor Azima Azman (EPU) 35. Mohd Azlan Mat Ali (Lynas Malaysia)	31 March 2021	Online	- Data of river water quality collected is showing an increment in the quality up to 61% of 400 overall river monitored by DOE - Recent cases in Selangor and Johor caused by irresponsible individual, which the punishment does not come from DOE alone but cooperation from other agencies such as local authority in Pasir Gudang, IWK, JPS - Rakan Alam Sekitar is one of the main components and becoming the 'eye' for JAS - Communication with the stakeholders • Risk communication • Engagement with the media • Conduct an information page reaching out to the grassroot level • Engage with local authority - Payment for Ecosystem Services – study conducted on how willing people to pay for environmental services, the response is poor from the public, so the policy is put in place - KASA strategic plan 2021-2030 has set the target each year for the number of unpolluted or less polluted rivers based on the 672 rivers monitored - DOE currently reviewing policy and regulations on Intensive or indiscriminate loggings, industrial scale agricultural projects, sand dredging, abandoned wreckage of barges have caused pollution, siltation, landslides in Sarawak - DOE currently reviewing policy and regulations on Effluent Standards. They have 'Jawatankuasa' experts on reviewing the policy. Also, on new emergent pollutant and ambient air. - Frequent water treatment plant shutdowns, especially in Klang Valley, and industrial illegal discharge into the river • Data of river water quality collected is showing an increment in the quality up to 61% of 400 overall river monitored by DOE

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
36. Elia Godoong (UMS) 37. Josephson (EPU Sarawak) 38. Mohd Zainal (Sapura) 39. Dr. Haslawati (DOF) 40. Aizat (MMC Pembetungan) 41. Afifi Zainal (TNB) 42. Yatimah Hj Ali (MMC-Gamuda) 43. Nor Huda Kamaruzaman (MOHE) 44. Amirul Afiq (BKSA Johor) 45. Mohd Husni (LKE) 46. Chang Cheng (EPSM) 47. Mohd Hafiz (MOH)			• Responsibility of the river is not on DOE alone • We have a special foundation with the local authority as well • Recent cases in Selangor and Johor caused by irresponsible individual, which the punishment does not come from DOE alone but cooperation from other agencies such as local authority in Pasir Gudang, IWK, JPS, and so on to ensure that our river is safe. - How would DOE encouragement through rakan alam sekitar and guided self- regulation (the prevention of the river pollution) • Function of EQA is not pollution control only but also on the environmental enhancement • Self-guided regulation – seven key items: 1) environmental policy, 2) environmental budget (e.g: in pollution control), 3) to have their own Jawatankuasa Pemantau Alam Sekitar which help their own enforcement in their own premises, 4) Environmental facility which include pollution control system, 5) Environmental capacity and personnel within their own premises 8) main certifications from EiMAS), 6) Environmental reporting and communication, and 7) Environmental transparency – these components also promoted to all projects which has the EIA approval not only for the industries - Messages from DOE to public • Join DOE in combating pollution • Please join as RAS member and get more activities from DOE
Discussion session for the National Agenda Roadmap Development Study for the Water Sector Transformation 2040 (WST2040) organised by the Advocacy, Awareness, Capacity Building and Public Participatory Platform Task	6 April 2021	Online	- Ecosystem services, water is a need, and must maintain the water sources, because water is human need for daily uses, daily industrial needs - Source of water, water catchment areas come from forest, so need to have greater emphasis on rivers

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
Force with the Ministry of Energy and Natural Resources Participants: 1. Prof. Dato' Mazlin Mokhtar (UKM/ASM) 2. Dr. Minhaz Farid Ahmed (UKM) 3. Dr. Zuritah A. Kadir (UKM) 4. Muhammad Irfan Masri (ASM) 5. Nurul Ain Sazalli (ASM) 6. Nurul Iman Abu Hanifah (ASM) 7. Siti Nurfazreen Abdul Rahman (ASM) 8. Lim You Rang (KeTSA) 9. Bhg. Tenaga Boleh Baharu_Noranis (KeTSA) 10. Quek Yew Aun (KeTSA) 11. Rahim BU (KeTSA) 12. Nor Azmi Ahmad (KeTSA) 13. Afzai Aziz (KeTSA)			- From energy sector; most of industry is the main user of water - Important to keep the riparian areas, the buffer riparian, importance of species of fauna travel from one fragment to another, keeps the water quality as well - Issues on Sungai Muda, so forest is an important element in water sector, need to put greater emphasis on rivers - For the natural disaster, especially that involved in Geology, for example land slide or possibility of earthquake, or reas that have potential disaster, a it is under respective ministry, also to look into biodiversity, also agencies that look into land as well. These agencies have their own branches that located in every state in Malaysia. - From energy sector; most of industry is the main user of water, from the study done, do we have any information on our our energy sector (for the uses of electricity and so on) what are the impacts towards water?
Feedback on the Information Application of the Interview Session for the National Agenda Roadmap Development Study for the Water Sector Transformation 2040 by *Lembaga Urus Air Selangor*	22 April 2021	Softcopy	- There was no issue in relation to a gap in national policy. However, there were several redundancies between the Federal Law and State Law which cover the same matters - In the Selangor context, SWMA with the approval of State Authority has enacted several IWRM's regulations - In Selangor there are no water right issues with different jurisdictions, and the water resources are adequate and not depending on other state. The capability of Selangor in providing adequate water resources is based on the alternative water resources from Hybrid of River Augmentation System (HORAS). - There are adequate linkages between water laws and water policy in the Selangor context - The Selangor Waters Management Authorities Enactment 1999 (SWMA Enactment) provides a platform to

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
			encourage the participation of all stakeholders as enunciated under several provisions - In context of SWMA, administration and operation of the agency is self-sustained through income/collection of enforced licensing and charging activities. Large amount of yearly budget will be used on development of water resources in Selangor, e.g; studies, operation. Thus, special funding for training/capacity building on IWRM is limited - Knowledge Transfer Centre should be established to collect and manage data from multi-stakeholders, studies and education module (STEM) related to IWRM. The centre will become a platform to link scientific group with political leader as well as communities. A book "Pendidikan Air STEM" which published by Malaysian Water Academy Sdn Bhd can be used as one of the modules.
Focus Group Discussion Water Sector Transformation 2040 by Awareness Raising, Advocacy And Capacity Building Sub-Sector (AACB Sub-Sector) with District Officers, Local Authorities and Chief Village of Muda River Basin, Petagas river and Baram River Basin. Participants: 1. Prof Dato' Mazlin Mokhtar (UKM/ASM) 2. Dr. Minhaz Farid Ahmed (UKM) 3. Dr. Zuritah A. Kadir (ASM) 4. Muhammad Irfan Masri (ASM) 5. Nurul Ain Sazalli (ASM) 6. Nurul Iman Abu Hanifah (ASM) 7. Siti Nurfazreen Abdul Rahman (ASM) 8. YBrs Vanessa Joseph 9. Safwan Penghulu Sidam Kanan 10. Mohamed Ishaq bin Sahul Hamid (Pejabat Tanah dan Galian Pulau Pinang	4 May 2021	Online	1. Majlis Perbandaran Kulim, Kedah - the need for capacity building for government officials: Awareness on and current state of the water issues, particularly in Kedah, and bring them together to a strategic direction - Regarding the training of government officers, for IWRM specifically there is no training on this - The main issue; a lot of people residing near riverbank, a lot if fund needed to manage these people - In Kulim, we also have to provide water for industrial needs, a lot of investors coming, which they need a lot more water - Kulim shows the residents' rubbish thrown in the river through their social media as an awareness programme - Some trainings that might related are under KPKT such as courses on: • Slope Management • Drainage Management • Floods

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
11. DO Serian (Lim HM) 12. PD Marudi 13. PD Telang Usan			2. Serian District Office - Our main issues here is the waste disposal facilities for rural area as we could not provide it, so the rubbish are thrown into the river and also buried in the ground - At our LA level, we are not exposed much for IWRM as we are only the implementor of projects from the State and Federal government - Few agencies related to this topic: 1. Lembaga Sungai - Sungai Sarawak 2. Lembaga Sumber Asli dan Alam Sekitar Sarawak 3. Jabatan Tanah dan Survey Negeri Sarawak 4. Jabatan Bekalan Air Luar Bandar 5. Lembaga Air Sibu 6. Lembaga Air Kuching 7. LAKU Management Sdn Bhd 8. DID, JKR, etc. - The locals' participation such as Ketua Kampung, JKKK and all are not a problem as we can ask them to participate - For training of government officials, training on waste disposal is only once or twice, another course is Pengurusan Tandas Awam - In the span of 20 years only two or three training courses joined (in related to this topic), the training done by Jabatan Kesihatan, KPKT Sarawak, and 3R programme by slots 3. Telang Usan District Office - Few suggestions from Telang Usan • Look into holistic perspectives, to get different agencies looking after the river, to be involved, for example in my areas has been involved in some which are the use of the river and how to protect it • Do study without any political involvement swill help - Government of Sarawak has put Telang Usan district under rural planning facility under the Highland Development Agency, which have few planning, can make collaboration with them

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
			- Ketua Masyarakat and Ketua Kampung to assist for the sustainability of water 4. Encik Safwan Penghulu Mukim Sidam Kanan, Kulim - Waste from the agricultural area is not a big problem as not much waste goes into the river - In this 'mukim', near the Sungai Muda, the activities here are: • Fisheries (inland fisherman) • Farming activities near the riverbank (corn, chilies and etc.) – only planting the plants temporarily
List of IWRM Resource Persons for AACB Government Cluster from various agencies	3 August 2021	E-mail/Online	28 Resource Persons from agencies below were obtained: 1. Lembaga Urus Air Selangor 2. Jabatan Pengairan dan Saliran 3. NAHRIM 4. FRIM 5. KPKT 6. Environment Protection Department, Sabah 7. Jabatan Mineral dan Geosains Malaysia 8. SWCorp 9. MOH
Inquiry on Integrated Water Resources Management (IWRM) for the National Agenda Roadmap Development Study for the Water Sector Transformation 2040 (WST2040) to all Local Authorities and District Offices throughout Malaysia	4 August 2021	E-mail/Online	All agencies below responded no/does not have any IWRM related training: 1. Majlis Daerah Penampang 2. Pejabat Daerah Kecil dan Tanah Gemas 3. Majlis Bandaraya Iskandar Puteri 4. Majlis Perbandaran Sibu 5. Majlis Perbandaran Sepang 6. Majlis Daerah Pendang 7. Pejabat Daerah Hulu Terengganu 8. Pejabat Daerah Pitas 9. Majlis Daerah Kampar 10. Majlis Daerah Kapit 11. Majlis Perbandaran Alor Gajah 12. Majlis Perbandaran Kajang 13. Majlis Bandaraya Seberang Prai
Request for Feedback on Integrated Water Resources Management (IWRM) Training Module for Government Sector by Advocacy, Awareness, Capacity Building (AACB) and PPPs Task Force to government agencies, Local Authorities and District Offices throughout Malaysia	20 September 2021	E-mail/Online	Responses/feedbacks obtained from KPKT, LUAS, Environment Protection Department Sabah, MOH and NAHRIM. The main findings are: 1. Suggest to include 'Overview and Introduction' which explains on the background, objectives, and the purposed of this module

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
			2. The framework of the overall module is not clear. Every level (basic, intermediate, and advance) is not explained and relate to **Table 7** and **Table 8**. 3. The method for implementation of the module training is not clear 4. To whom will the fund on the implementation of the training be given to. 5. The estimation of budget for government officers should follow the eligibility and rate of government officers. 6. The module should be more specifically based on the job scope of the government officers – federal government officers should be trained more on legal and policies while local authorities on enforcement 7. To include Water Safety Plans (WSPs) within the Disaster Risks and Problem-Solving Approaches via IWRM 8. To integrate WSP and Sanitation Safety Plan (SSP) methodology within the Intermediate Level 1 – Advocacy via Training 9. To include policy and regulatory instruments supporting IWRM within the Intermediate Level 1 – Advocacy via Training 10. For basic level awareness, suggest 1.1.3 Environment Impact of Mining, Logging and Water Security 11. For 1.2.1 Integrated River Basin Management (IRBM) - suggest to add 1.2.1.1: Integrated Flood Management (IFM) 12. For basic level awareness, suggest 1.3 IWRM Practices and Implementation Status in Malaysia and other countries 13. For basic level awareness, suggest to add 1.4: Current Water Laws And Policies In Malaysia? 14. For Intermediate Level 1-Advocacy via Training, suggest to add 2.2 Risk Assessment, 2.2.2 Forecasting and Warning System, 2.2.3 Research and Development (R & D) Potential Priority Areas

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
			15. For Intermediate Level 1 – suggestion to include topic about Water Forensic (to identify the pollution) in Risk Assessment 16. To add water resource management at state level
Discussion session for the National Agenda Roadmap Development Study for the Water Sector Transformation 2040 (WST2040) organised by the Advocacy, Awareness, Capacity Building and Public Participatory Platform Task Force with the Ministry of Environment and Water (KASA) Participants: 1. Dr. Ching Thoo a/l Kim (KASA) 2. Dr. Razul Ikmal Ramli (KASA) 3. Prof Dato' Mazlin Mokhtar (UKM/ASM) 4. Dr. Minhaz Farid Ahmed (UKM) 5. Dr. Goh Choo Ta (UKM) 6. Dr. Lee Khai Ern (UKM) 7. Dr. Zuritah A. Kadir (ASM) 8. Muhammad Irfan Masri (ASM) 9. Nurul Ain Sazalli (ASM) 10. Nurul Iman Abu Hanifah (ASM) 11. Siti Nurfazreen Abdul Rahman (ASM)	23 September 2021	Online	1. For AACB, we want to make people understand; too much, too little, too dirty water, to lead them to pay more to manage/treat water 2. KASA working hard on revising the water tariff called Tariff Setting Mechanism, this would cut across people and industry group, this is a fair and transparent mechanism, how much water comes in, how much water treated, these are all for people to know. We cannot have a standardised water rate, but a structure can. To have similar water rate in Selangor as in Melaka is impossible 3. Forum Air – established under Section 70 under WSIA act, this body is doing exactly what AACB is doing, an arm under SPAN, especially in water tariff 4. Denai Sungai Kebangsaan – as of this year, we have established more than 200km of trails, focussing more in Selangor, Johor, Kelantan, Negeri Sembilan; an approach to make people closer to water source, we have compiled all in the form of publication, parts for the DSK also can be extracted out and put into AACB module. The target for next 5 years is to have 5,000km of trails (end of 12MP). 5. Ultimate plan of KASA is to turn NAHRIM into a water university, probably in 30 years' time from now. Currently, NAHRIM will be a water research institute. They will look into the policy part apart from their science research. They also come out with Malaysian Water Sector Innovation roadmap 2023. 6. Act 655 and 654; enacted 10/15 years ago, in process to amend these two acts to make sure they could address for the

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Stakeholders Engagement	Dates	Physical/Hybrid/ Online	Main Findings
			current challenges. This area relates to AWF task force, bringing in more investment to water sector. Currently the licensing period is 3 years, we would like to lengthen it to at least 10 years to encourage investors, subjected to SPAN regulation. Problem to convince people whether to bring concession to the industry or not. 7. KASA involvement in Sabah Sarawak is limited, because the Acts 655, 644 does not cover in Sabah and Sarawak has their own ordinance, their own JPP 8. KASA do consider Sabah Sarawak, but in term of investment they come from the state government 9. AACB suggestion on licensing part, for LA/DO to be implemented for a training on water before we grant them license – possible might be cost implication, and also licensing is also supervised by MITI, maybe fall into MITI focus area. E.g: Gebeng area, a case where MITI must know current condition of water supply and demand before allowing investors to go in Gebeng industrial area 10. On AACB module training, suggest for new KASA officials first to test the relevancy of modules, to know the implementable part of module, the training can be done at KASA, or some other event location 11. Who is going to own this study? EPU has more power to call for a meeting as compared to other ministries 12. For State wise, the most appropriate way for us to come/go/suggest plans are through EXCO meeting. For paperwork, we provide them a complete paperwork first and present to them on what we want to do

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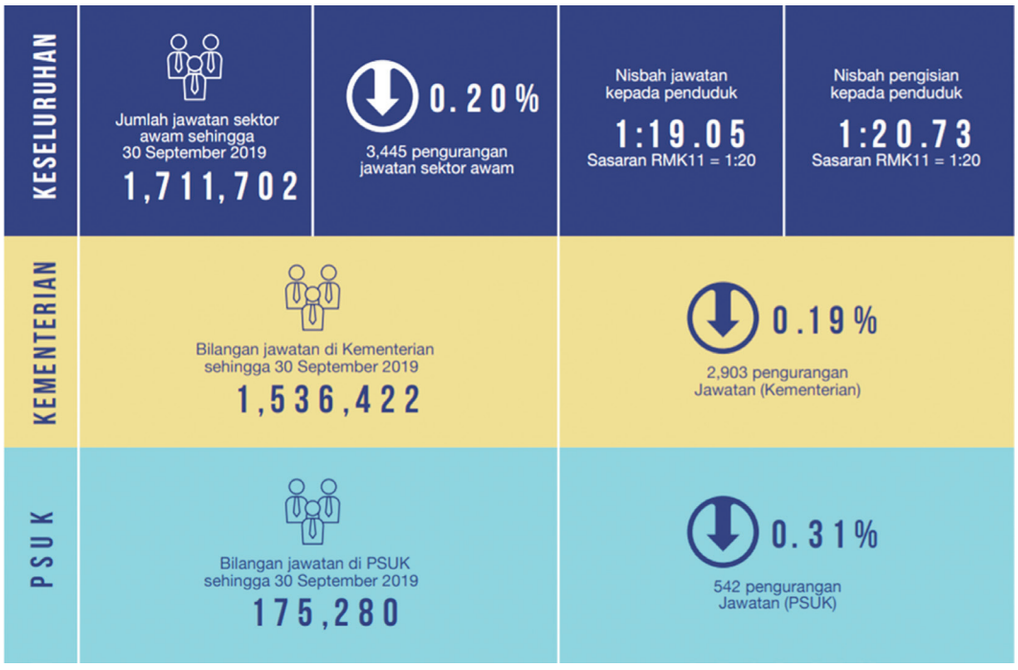
7.3.3 The Roadmap of AACB Government Cluster towards WST2040

The main objective of AACB government sector in the roadmap of WST2040 is to enhance the leadership skills of government officials, especially of the local government to accelerate the implementation of IWRM via the "business unusual" training module of AACB. Therefore, the roadmap scopes include all the civil servants in Malaysia, i.e. approximately 1.71 million and all the existing platforms related to the government sector for water management. Hence, the expected output will be the training of the local authorities (i.e. 154) and district office (i.e. 171) along with civil servants from various ministries and agencies on IWRM where the district officials in 94 district offices of Dept. of Irrigation and Drainage Malaysia (**Table 7.7**) will be one of the key resource persons to train other civil servants for training of trainers (ToT). Therefore, the expected outcome will be the proactive and effective leadership roles of civil servants for the participatory decision-making processes to accelerate the implementation of Integrated Water Resources Management (IWRM).

Table 7.7: Key Institutions at Local Level to Accelerate the Implementation of IWRM in Malaysia

Sl. No.	Institutions	Total Number
01.	Local Authorities	154
02.	District Offices	171
03.	JPS District Offices	94

The total position of government servants in Malaysia is approximately 1,711,702 that is consist of 1,536,422 at Federal Government Level and 175,280 at the state government level (**Figure 7.18**). The ratio of civil servants to the total population of the country recorded is 1: 20.89, exceeding the target set in the 11MP (1:20) (JPA, 2019).



Source: JPA, 2019

Figure 7.18: Number of Government Officials at the Federal and State Government in Malaysia

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Therefore, to achieve the proactive and effective leadership roles of civil servants for the participatory decision-making processes for Integrated Water Resources Management in Malaysia, the current status of the government sector has been explored based on the literature review, interview, webinar, online questionnaire survey, workshops and focus group discussion sessions with the relevant stakeholders (**Table 7.7**). The findings were arranged following the five focus areas, i.e., people, governance, information and RDIC, infrastructure and technology, and finance of WST2040 study to suggest appropriate strategies and budget (**Table 7.8**).

Water as a Resource

IWRM covers the whole cycle of water management that includes the planning, developing, distribution, and managing the optimum uses of water resources. Undoubtedly, within the IWRM, people are the key element to drive the water resources management successfully. Therefore, AACB and PPPs play a significant role in water management from the perspective of non-structural capacity building.

1. People

The institutionalisation of public participatory platform (PPP) will be effective for the decision-making processes of IWRM by civil servants. Therefore, AACB training programme will motivate the civil servants and encourage them to enhance their participation in PPPs to improve the decision-making processes for IWRM.

The training of 154 local authorities and 171 district officials for their proactive leadership roles will accelerate the implementation of IWRM. Capacity building and continuous improvement of leadership skills of civil servants, including 154 local authorities and 171 district officials, will be enhanced via the AACB training programmes, significantly improving their communication skills, river care knowledge, environmental subjects such as ecology, general organisation and management skills and others in related issues.

2. Governance

AACB training module will enhance leadership roles of civil servants to facilitate the enforcement of policies and laws for improved water governance. To enhance the enforcement capacity of civil servants via AACB training programme, Dato' Ir. Nor Hisham bin Mohd. Ghazali, Director General- Department of Irrigation and Drainage Malaysia has offered 94 JPS district officials to train civil servants for ToT on IWRM from the perspective of integrated river basin management.

3. Information and RDIC

AACB training module will guide the civil servants for the integrated and comprehensive data-sharing framework to accelerate the implementation of IWRM. Therefore, to ensure the flow of reliable data and information from relevant agencies to the local government for IWRM, stakeholders' mapping for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information is crucial to improve the decision-making processes for IWRM.

4. Infrastructure and Technology

IWRM training centres such as Pusat Informasi Sungai and others should have adequate online/on-site facilities considering the uncertainties. Therefore, to advocate IWRM by the civil servants using AACB training programme, virtual and on-site role-play of water experts at the training centres and at the PPPs are crucial to enhance the leadership skills of local government in decision-making processes for IWRM. Moreover,

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Table 7.8: Status of Government Sector with Proposed Principal Targets and Strategies for AACB and PPPs WST2040

FOCUS AREAS	CURRENT SITUATION	TARGETS	STRATEGIES	IMPLEMENTING AGENCIES
PEOPLE	• Existing number of PPPs linked with government are inadequate and PPPs have not been institutionalised.	• To enhance participation of civil servants in PPPs in order to ease decision making for IWRM via AACB training programme.	• Training of 154 local authorities and 171 district officials along with relevant ministries and agencies for the proactive leadership roles to accelerate the implementation of IWRM.	Inter-Ministerial consortium chaired by KASA to undertake AACB training programme nationwide incorporating KPKT, chief secretary of the Federal Territories and State Government.
GOVERNANCE	• National policies are inadequate to support AACB. Some states have legal instruments for water resources, however, other states have yet to adopt.	• To enhance enforcement capacity of civil servants via AACB training programme.	• 94 JPS district officials to train civil servants for ToT on IWRM from the perspective of integrated river basin management along with appropriate 'Water Framework Directives'.	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.
INFORMATION AND RDIC	• Data sharing is still a challenge, although there are policies for integrated and comprehensive data management, e.g. Solid Waste Management Policy.	• To ensure flow of reliable data and information from relevant agencies to the local govt. for IWRM.	• Stakeholders' mapping for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information in 13 States and 3 Federal Territories to ease the decision-making processes for IWRM.	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.
INFRASTRUCTURE AND TECHNOLOGY	• IWRM training centres such as Pusat Informasi Sungai and other should have adequate facilities considering the uncertainties.	• To advocate IWRM by the civil servants via ToT using AACB training programme.	• Virtual and on-site role-play of water experts at the training centres in 13 States and 3 Federal Territories, and at the relevant PPPs at 189 major river basins to enhance skill of local government in decision-making processes for IWRM.	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.
FINANCE	• Much allocation by govt. for water supply, sewerage, and license, however, not adequate funds for non-structural capacity building.	• To implement comprehensive AACB programme at the PPPs.	• Finance for the pool of water experts to advocate IWRM and to train future water leaders using the facilities at the National Training Centres of 13 States and 3 Federal Territories.	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.

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Table 7.9: AACB Government Sectors' Budget 2022-2040

Water as a Resource/Water Security and Sustainability

Strategy	Initiatives	Programmes/ Activities	Lead Ministry/ Organisation	Budget (RM <000,000)									Target Completion	Remarks
				2021	2022	2023	2024	2025	Total 12MP	13MP	14MP	15MP		
Institutionalisation of public participatory platform (PPP) for the effective decision-making processes of IWRM	To enhance participation of civil servants in PPPs in order to ease decision making for IWRM via AACB training programme	National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum	KASA/JPA	-	RM3,600,000	RM3,600,000	RM3,600,000	RM3,600,000	RM14,400,000	RM18,000,000	RM18,000,000	RM18,000,000	12MP and Beyond	Inter-Ministerial as well as line agencies Consortium to undertake appropriate measures for the participation of civil servants in PPPs
Training module to enhance leadership roles of civil servants in order to facilitate the enforcement of policies and laws for better water governance.	To enhance enforcement capacity of civil servants via AACB training programme.	1.1.1 Trainee (RM)	KASA	-	RM3,825,000	RM40,725,000	RM407,025,000	RM4,029,525,000	RM4,481,100,000	RM1,426,418,333	RM1,426,418,333	RM1,426,418,333	12 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as JPS district office, MSANg, JAS, PBT, & DO.
		1.1.2 Trainer (RM)		-	RM1,020,000	RM5,400,000	RM54,240,000	RM542,640,000	RM603,300,000	RM190,189,111	RM190,189,111	RM190,189,111		
		1.1.3 Events/logistic (RM)		-	RM6,941,000	RM73,494,000	RM738,206,400	RM7,385,330,400	RM8,203,971,900	RM2,588,473,802	RM2,588,473,802	RM2,588,473,802		
		1.1.4 Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/training x 2 pax. X 16 states)		-	-	RM960,000	RM960,000	RM960,000	RM2,880,000	RM4,800,000	RM4,800,000	RM4,800,000		
Integrated and comprehensive data sharing and management	To ensure flow of reliable data and information from relevant agencies to the local govt. for IWRM.	Digitalisation of WST2040 AACB training module (Lump sum)	KASA/KPKT/ MOH							RM50,000	RM50,000	RM50,000	13 MP and Beyond	Inter-Ministry consortium chaired by KASA as well as JPS district office,
		GIS map preparation for district and local authority boundary of 189 river basins & Web-based pollution mapping via sensor (Lump Sum RM10,000/River Basin)			RM1,890,000	RM50,000	RM50,000	RM50,000	RM2,040,000	RM100,000	RM100,000	RM100,000	12MP and Beyond	
Adequate funds for non-structural capacity building towards IWRM.	To implement comprehensive AACB programme at the PPPs.	1.1.1 Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and	KASA/KPKT/ MOH			RM625,000	RM650,000	RM2,575,000	RM3,850,000	RM6,500,000	RM6,500,000	RM6,500,000	12MP and Beyond	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.

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continued

Water as a Resource/Water Security and Sustainability														
Strategy	**Initiatives**	**Programmes/ Activities**	**Lead Ministry/ Organisation**	**Budget (RM <000,000)**									**Target Completion**	**Remarks**
				2021	**2022**	**2023**	**2024**	**2025**	**Total 12MP**	**13MP**	**14MP**	**15MP**		
		onwards) (Lump sum RM2,500/pax/training x 232000 units)												
IWRM training centres such as Pusat Informasi Sungai and other should have adequate online/ on-site facilities considering the uncertainties.	To advocate IWRM by the civil servants via ToT using AACB training programme.	Developing a portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management (LS RM750,000)	KASA/KPKT/ MOH		RM750,000	RM750,000	RM750,000	RM750,000	RM3,000,000	RM750,000	RM750,000	RM750,000	12MP and Beyond	Inter-Ministry consortium chaired by KASA as well as SEPU, JPS district office, MSANg, JAS, PBT, & DO.
		Establishment of WST2040 AACB Water Hub in 13 States and 3 F.T. for public participatory and effective decision-making processes of IWRM. (Lump sum RM15,000 x 16 units)			RM60,000	RM60,000	RM60,000	RM60,000	RM240,000	RM60,000	RM60,000	RM60,000		
		4 Training Events in every year (1 training = 4 days) (Lump Sum)			RM1,363,000	RM1,363,000	RM1,363,000	RM1,363,000	RM5,452,000	RM6,815,000	RM6,815,000	RM6,815,000		
		1 Coordinator for IWRM Training with an FASc based at LESTARI, UKM (RM15,000/month)			RM180,000	RM180,000	RM180,000	RM180,000	RM720,000	RM900,000	RM900,000	RM900,000		
		5 Assistants to facilitate IWRM Training based at LESTARI, UKM (RM5,000/month)			RM300,000	RM300,000	RM300,000	RM300,000	RM1,200,000	RM1,500,000	RM1,500,000	RM1,500,000		
		Honorarium for Resource Person (RP) to facilitate IWRM Training (Lump sum RM10,000/pax/ training x 1,567 pax)			RM270,000	RM380,000	RM380,000	RM370,000	RM1,400,000	RM2,800,000	RM4,200,000	RM7,000,000		

* *Note*:
1. Trainee (RM2,500/Training)
2. Trainer in 2022 (RM20,000/Training) with the help of AACB Team. Trainer 2023 onwards (RM10,000/Training)
3. Logistic RM136,100/Training

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Type	Parameters	2022	2023	2024	2025	Total (pax) (2022-25)	2026-30	2031-35	2036-2040
Training	Trainee (pax)	1,530 (0.09%)	16,290 (0.91%)	162,810 (9.08%)	1,611,810 (89.92%)	**1,792,440 (100%)**	570,567 (33.3%)	570,567 (33.3%)	570,567 (33.3%)
	Basic (pax)	765 (50%)	8,145 (50%)	81,405 (50%)	805,905 (50%)	**896,220 (50%)**	5,555 (6%)	5,555 (6%)	5,555 (6%)
	Intermediate (pax)	459 (30%)	4,887 (30%)	48,843 (30%)	483,543 (30%)	**537,732 (30%)**	9,258 (10%)	9,258 (10%)	9,258 (10%)
	Advance (pax)	306 (20%)	3,258 (20%)	32,562 (20%)	322,362 (20%)	**358,488 (20%)**	477,984 (84%)	477,984 (84%)	477,984 (84%)
	Trainer (pax)	7 + AACB Team	45	452	4,522	**5,026**	40,295	63,559	77,823
	Training Events (no.)	51 (by AACB)	45 x 12 months = 540	452 x 12 months = 5,424	4522 x 12 months = 54,264	**5026 x 12 months = 60,312**	1585 x 12 months = 19,020	1585 x 12 months = 19,020	1585 x 12 months = 19,020

Figure 7.19: AACB Government Sectors Training 2022-2040

Note:

1. Total Trainee (pax) is consist of Basic (50%), Intermediate (30%), and Advance (20%) Trainee for each year from 2022 to 2025.
2. Trainer 7 pax in 2022 is based on the 9 training events by AACB Team (i.e. 30 pax/training x 9 training = 270 pax, 2.5% of 270 pax is 7 pax)
3. The 7 Trainers will conduct 6 sessions (i.e. 30 pax/training x 6 events x 7 Trainers = 1260 pax (Trainee) with the help of AACB Team)
4. Total Trainee in 2022 is 1,530 pax (i.e., 270 pax by AACB + 1260 pax by 7 Trainers = 1,530 pax)
5. 2.5% of 1,530 Trainee in 2022 is 38 pax (i.e. 38 Trainer). Therefore, in 2023 the Trainer no. is 45 (i.e., 38 pax + 7 pax in 2022 = 45 pax)
6. 2.5 % of Total Trainee 16,290 pax in 2023 is 407 pax (i.e., 407 Trainers). So, total Trainer in 2023 is 452. Similar calculation has been done until 2025
7. Total basic and intermediate levels' trainee in 12MP is 1,433,952 pax, & it is distributed equally (i.e. 477,984 pax (84%)) for advance training (i.e. retraining) in 13MP, 14MP & 15MP.
8. Total Trainee 570,567 pax (33.3% of 1.7 million govt. officials) in 13MP, 14MP & 15MP, respectively is consist of Basic 6%, Intermediate 10% and Advance 84%.
9. Basic 6% and Intermediate 10% Trainee in 13MP to 15MP are the new govt. Officials.
10. Training events in 2022 is 51 no's (i.e., 9 events by AACB + 42 events by 7 Trainers (7 pax X 6 months))
11. Training events in 2023 is 540 no's (i.e., 45 Trainers x 1 Training event/month x 12 months = 540 no's). Similar calculation for the rest of the years.
12. 30 pax (i.e., Trainee) per training by 1 Trainer.

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developing and promoting common platforms for government officials should also include all the relevant stakeholders for IWRM. The development of web portal, establishing or promoting community-based River Care Centre, nationwide road show, existing local community centres, identifying successful NGOs/CBOs as IRBM local champion and trainers and as such will be useful to share information related to IWRM, IRBM and WST2040.

5. Finance

Continuous Federal funding is vital for the rehabilitation and restoration of river basin management. The AACB training programme will simultaneously enhance the leadership roles of civil servant for rehabilitation and restoration of river basin management. Federal funding is the main strength to adopt the green economic approaches for IWRM in Malaysia. Therefore, adequate green funding along with training will encourage civil servants for sustainable water resources management while applying green economic approaches such as 'payment for ecosystem services', application of 'polluter pays' principle, and uniform pricing model for water resources, and as such. Moreover, water-based recreation and tourism activities via AACB training programme also will encourage local authorities to promote local level income generation while incorporating the local communities.

Water as a Livelihood

IWRM does not only be seen water as natural resource but also as a potential utility for income generation and livelihood.

1. People

AACB Training module will enhance the awareness of the civil servants about the value of water. Therefore, the civil servants will be more willing to take care water resources while promoting and managing river basins based on recreational and tourism activities. Hence, the function of available existing platforms such as 'Closing the Loop'- plastic waste management in Kuala Lumpur by Urbanice Malaysia; *Jawatankuasa Pelaksana Pemuliharaan Sungai-Sungai Negeri Selangor* chaired by the Yang Berhomat Tuan Ir. Izham bin Hashim, EXCO Infra (Pengerusi Jawatankuasa Infrastruktur dan Kemudahan Awam), National River Trails (Denai Sungai Kebangsaan) by KASA, *Program Sungai dan Pantai Angkat Negeri Selangor*, Qua-Qua (Quality & Quantity) Program by LUAS, One District One River Programme, Majlis Sumber Air Negeri (MSAN) and as such should be strengthened for IWRM.

2. Governance

Partnerships amongst agencies and joint programmes amongst government sectors are the keys for a successful IWRM. Collaboration and smart partnership also help to build linkage to enhance knowledge and help foster connectivity between agencies to develop a common sense of ownership. Initiatives through trainings, hands-on workshops, and site visits, public dialogues, and workshop as well as events, peer to peer learning and project networking among govt. agencies, e.g. between DOE, DID, KPKT, JPP etc. will also accelerate the implementation of IWRM.

3. Information and RDIC

Continuous RDIC (i.e. research, development, innovation and commercialisation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDIC will effectively facilitate the real time decision making of civil servants, especially at the local level to promote decision-making

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processes quickly. In this regard, the stakeholders mapping, series of dialogue and consultations amongst the federal, State, and local level stakeholders will also justify the use of real time data and information coming from RDIC for IWRM.

4. Infrastructure and Technology

Land affected/near dead rivers should be given full priority for pollution issues and if necessary, should be gazetted. One District One River Programme by JPS should adopt suitable structural and non-structural measures to reduce water pollution and avoid shutdowns of water treatment plants.

5. Finance

There should have adequate funds for non-structural capacity building towards IWRM, comprehensive AACB programme at the PPPs, finance for the pool of water experts to advocate IWRM and to train future water leaders using the facilities at the National Training Centres. Incentives and awards should be provided for the green watershed restoration, as well as nature-based solutions for the watershed restoration. Green incentives, and certification and awards should be given to the SMEs (i.e., small and medium enterprises) by the local government for attending the AACB WST Training programme before water servicing licensing and relicensing.

7.3.4 The Training Module for Government Cluster

The government is very keen and focussed to incorporate water resources in the national development agenda. Therefore, the Economic Planning Unit (EPU) via the Academy of Sciences Malaysia (ASM) has embarked on the Water Sector Transformation 2040 (WST2040) study with the aspirations to contribute from the water sector to the national GDP (Gross Domestic Product), especially considering water as one of the important components of KEGA (i.e., Key Economic Growth Activities) in the 5 Year Malaysia Plans. Hence, the government cluster, one of the four clusters of the AACB Sub-Sector within the WST2040 study has mainstreamed awareness-raising, advocacy, and capacity building of government officials for IWRM via special training programme using the business unusual training module. The training module, strategy, and roadmap for WST2040 has been produced reviewing relevant existing policies; comparing capacity-building practices of IWRM between Malaysia and several other developing as well as developed nations; conducting several national and international webinars; arranging several interviews, focus group discussion (FGD) sessions, and national level workshops; and online questionnaire survey. Moreover, the field visits to several existing training centres throughout Malaysia have been done not only to propose suitable on-site IWRM training in 13 states and 3 federal territories; but also, to institutionalise and link the existing public participatory platforms (PPPs) such as Rakan Alam Sekitar (RAS), River of Life (RoL), Friends of Rivers (FoR) and as such with the proposed training centres/ water hubs of AACB. Thus, the capacity building of government officials via training is aimed to encourage their proactive leadership roles to accelerate the implementation of IWRM via collaboration and partnership with multi-stakeholders.

The IWRM AACB WST2040 Training Module for government officials is designed from the perspectives of disaster risk reduction (DRR) considering both natural and man-made water-related disasters. The DRR perspective has been included in the training module to prepare the government officials for the worst situation to tackle water-related disasters so that they can act promptly to reduce the frequency and intensity of future disasters. Moreover, the strategies and roadmaps in the AACB government cluster are also aligned with the aspirations of 12th to 15th MP, where the capacity building of 154 local authorities and 171 district

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officials are the keys for water sector transformation. The strategies of AACB government cluster in the five focus areas, i.e., people, governance, information and RDIC (i.e., Research, Development, Innovation and Commercialisation), finance, and infrastructure and technology of the 12th MP are also meant to fulfil the objective of accelerating the implementation of IWRM. The strategies have also focussed on listing the IWRM resource persons/experts from the government sector to train the future water leaders using the already prepared training module by the AACB government cluster. Hence, the capacity building of local authorities, district officials, as well as enforcement officials from other agencies at the local level are real keys to drive the implementation of IWRM and contributing to the sustainable development goals (SDGs). In the Federal-State government system country like Malaysia, the capacity building of local and state government via training are important to harmonise the policy implementation in collaboration with the Federal government because constitutionally natural resources i.e., land, water, forest and as such are within the jurisdiction of the state government. Therefore, the awareness-raising, advocacy and capacity building of officials at the chief secretary offices of each state, and states' EXCO (i.e., State Executive Council) are also important for clear directives on IWRM to the local government in line with the Federal government.

Awareness-raising and shared prosperity vision amongst the key leaders and stakeholders in the Quadruple Helix Stakeholders' Model are vital, and it is needed for a successful water sector transformation in Malaysia. The Conference of Rulers, Parliamentarians, and State Governments could be a beneficial avenue to build awareness and garner commitment from various key players. Therefore, the role of the state secretary is very influential to motivate not only the government officials but also the relevant stakeholders towards WST in Malaysia using the AACB Training Module. Mesyuarat Menteri-Menteri dan Ahli-Ahli Majlis Mesyuarat Kerajaan Negeri yang Bertanggungjawab Mengenai STI (MEXCO-STI) can be used as a medium to deliver and discuss the findings of WST2040 since matters pertaining to water are under the purview of the state government. Furthermore, the Razak School of Government can promote similar awareness-raising and capacity building amongst Secretary Generals and Deputy Secretary Generals of Ministries via the "business unusual" AACB WST2040 Training Modules.

Apart from the capacity building of the local, state, and federal government; the awareness-raising and advocacy of the Parliamentarian for IWRM could be very useful to motivate the people at the ground and supportive to the local government in terms of policy enforcement. Therefore, the link-up of PPPs such as All-Party Parliamentary Group Malaysia (APPGM) along with the activities of AACB are very important to accelerate the implementation of IWRM. As a result, the monitoring and protection of water bodies by the enforcement officials at the Local Government, Dept. of Irrigation and Drainage (DID), Dept. of Environment (DOE), State Water Agencies and as such will be smooth to fulfil not only the aspirations of 12th MP but also the expectations of 13th MP about the uplifting of indigenous technologies for IWRM. Integrated and comprehensive data and information sharing amongst the agencies and multi-stakeholders, considering both the S&T (i.e., Science and Technology) as well as SSH (i.e., Social Science and Humanities) data and information about the 189 major river basins, will facilitate the decision-making processes of local government for the better implementation of IWRM while also incorporating and considering the issues of environmental health. Moreover, IWRM is also one of the important components of the environment pillar under the Shared Prosperity Vision, 2030 (SPV2030) aligned with the sustainable development goals 2030 (SDGs2030). Moreover, the aim of SPV2030 is to ensure better balances amongst the three pillars (i.e., environmental sustainability, social inclusion, and economic development) whereby IWRM plays a crucial role both as 'water as a resources' and 'water as an economic opportunity'. The remote sensing and GIS (i.e., Geographic Information System) based pollution source mapping of 189 major river basins within the jurisdiction of 154 Local Authorities and 171 District Offices will facilitate the watershed management scientifically by the local government. Similarly,

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the fund for non-structural capacity building of SMEs (i.e., Small and medium-sized enterprises), especially including tourism actors via the AACB Training Programme will also contribute to the green growth of the country via proving license only after attending the AACB Training Programme. This can also be a source of revenue generation for AACB from the SMEs via fixing a token amount for the training of individuals. Hence, the expectations of achieving economies of scale in the 14th MP will be ensured via AACB Training Programme. Moreover, the use of the existing PPPs and other facilities such as Pusat Sg. Informasi of DID, National River Trail Programme of KASA, All-Party Parliamentary Group Malaysia (APPGM) in link with AACB water hubs where both the online and on-site training facilities are provided, considering the uncertainties like the Covid-19 pandemic, to become the regional water hub according to the aspirations in 15th MP. Therefore, the AACB government cluster has focussed on the capacity building of officials via the business unusual training module while also considering the 8i Model of whole water ecosystem management.

7.4 Importance of the People: Academia

Prof Madya Dr. Goh Choo Ta, Prof Dato' ChM. Mazlin Mokhtar and Mohd Irfan Masri

7.4.1 Background

The word 'Academia' has a broad meaning where it is not only focus on the academics at the universities, but it encompasses the environment or community that is concerned on teaching, learning, research, etc. The core elements under Academia are the knowledge and education. Oxford Learner's Dictionaries (online) defines 'knowledge' as the state of knowing about a particular fact or situation; or the information, understanding and skills that someone gain through education or experience; whereas 'education' is a process of teaching, training and learning in schools, colleges or universities, to improve knowledge and develop skills.

As far as AACB is concerned, the AACB Team has identified the scope under the Academia Cluster, as below:

i. Preschool,
ii. Primary School,
iii. Secondary School,
iv. Tertiary Education,

and the Academia Cluster has also referred to the National Education Philosophy when preparing the roadmap under WST2040:

> *"Education in Malaysia is an ongoing effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally, and physically balanced and harmonious, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving high levels of personal well-being as well as being able to contribute to the harmony and betterment of the family, the society, and the nation at large"*
>
> *(The National Education Philosophy for Malaysia, written in 1988 and revised in 1996. This Philosophy is also being referred by the Malaysia Education Blueprint 2013-2025)*

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In Malaysia, the Ministry of Education Malaysia (KPM) is responsible to develop and sustain a quality education system that capable to develop individual's potential in order to achieve aspirations of the nation. In general, KPM is obliged to cover preschools, primary schools and secondary schools, where KPM standardises syllabus, ensures quality and adequate teachers, provides sufficient infrastructures, and allocate adequate funding for school management and maintenance. All the efforts by KPM are to produce individuals that are intellectually, spiritually, emotionally, and physically balanced and harmonious, which is in accordance with the National Education Philosophy. In the Malaysia Education Blueprint 2013-2025, it also emphasises that every student should have 6 key attributes to be globally competitive, namely knowledge, thinking skills, leadership skills, bilingual proficiency, ethics and spiritual, and national identity. The descriptions of the 6 key attributes are shown in **Table 7.10**.

Table 7.10: Descriptions of 6 key attributes needed by every student to be globally competitive

Key attributes	Description
Knowledge	At the most basic level, every child will be fully literate and numerate. Beyond this, it is important that students master core subjects such as Mathematics and Science and are informed with a rounded general knowledge of Malaysia, Asia, and the world. This would include their histories, people, and geography. Students will also be encouraged to develop their knowledge and skills in other areas such as the arts, music, and sports.
Thinking skills	Every child will learn how to continue acquiring knowledge throughout their lives (instilling a love for inquiry and lifelong learning), to be able to connect different pieces of knowledge, and to create new knowledge. Every child will master a range of important cognitive skills, including critical thinking, reasoning, creative thinking, and innovation. This is an area where the system has historically fallen short, with students being less able than they should be in applying knowledge and thinking critically outside familiar academic contexts.
Leadership skills	In our increasingly inter-connected world, being able to lead and work effectively with others is critical. The education system will help every student reach his or her full potential by creating formal and informal opportunities for students to work in teams, and to take on leadership roles. In the context of the education system, leadership encompasses four dimensions: entrepreneurship, resilience, emotional intelligence, and strong communication skills.
Bilingual proficiency	Every child will be, at minimum, operationally proficient in Bahasa Malaysia as the national language and language of unity, and in English as the international language of communication. This means that upon leaving school, the student should be able to work in both Bahasa Malaysia and English language environment. The KPM will also encourage all students to learn an additional language.
Ethics and spiritual	The education system will inculcate strong ethics and spirituality in every child to prepare them to rise to the challenges they will inevitably face in adult life, to resolve conflicts peacefully, to employ sound judgement and principles during critical moments, and to have the courage to do what is right. The education system also seeks to nurture caring individuals who gainfully contribute to the betterment of the community.
National identity	An unshakeable sense of national identity, tied to the principles of the *Rukun Negara*, is necessary for Malaysia's success and future. Every child will proudly identify as Malaysian, irrespective of ethnicity, religion or socio-economic status. Achieving this patriotism requires that every child understands the country's history and shares common aspirations for the future. Establishing a true national identity also requires a strong sense of inclusiveness. This can be achieved through not only learning to understand and accept diversity, but to embrace it.

Source: Ministry of Education Malaysia, 2013

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A quality education system is vital to nurture young generation, and the education system must be supported by adequate resources, including both human and financial resources. As of 31 March 2021, there are about 5 million students (including students from preschools, primary schools, and secondary schools) throughout Malaysia (**Table 7.11**). In order to have sufficient resources to teach these students, Malaysia have trained 423,140 teachers, and have established 16,440 schools that consists of 194,091 classes (Ministry of Education Malaysia, 2021). The details for different types of schools are shown in **Table 7.11**.

Table 7.11: Details for different types of schools in Malaysia

Types of Schools	Number of Students	Number of Teachers	Number of Schools	Number of Classes
Preschools	206,678	9,315	6,215	9,676
Primary Schools	2,765,456	236,348	7,780	106,476
Secondary Schools	2,034,358	177,477	2,445	77,939
TOTAL	5,006,492	423,140	16,440	194,091

(*Updated 31 March 2021*)
Source: Ministry of Education Malaysia, 2021

Besides the preschools, primary and secondary schools, the tertiary education is also important in moulding a generation that is knowledgeable, ethic, creative, innovative and responsible. There are 20 public universities in Malaysia, namely Universiti Malaya (UM), Universiti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), Universiti Putra Malaysia (UPM), Universiti Teknologi Malaysia (UTM), Universiti Utara Malaysia (UUM), Universiti Islam Antarabangsa Malaysia (UIAM), Universiti Malaysia Sarawak (UniMAS), Universiti Malaysia Sabah (UMS), Universiti Pendidikan Sultan Idris (UPSI), Universiti Teknologi MARA (UiTM), Universiti Sultan Zainal Abidin (UniSZA), Universiti Malaysia Terengganu (UMT), Universiti Sains Islam Malaysia (USIM), Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Teknikal Malaysia Melaka (UTeM), Universiti Malaysia Pahang (UMP), Universiti Malaysia Perlis (UniMAP), Universiti Malaysia Kelantan (UMK) and Universiti Pertahanan Nasional Malaysia (UPNM) (Ministry of Higher Education, 2020). Besides public universities, there are also numerous private higher education institutions (HEIs) in Malaysia, as shown in **Table 7.12**. Both public universities and private HEIs play an important role in providing tertiary education. **Table 7.13** shows different types of student enrolment of universities and private HEIs in 2019, whereas **Table 7.14** shows number of lecturers in universities and private HEIs in 2019.

Table 7.12: Numbers of private higher education institutions in Malaysia

Private higher education institutions (HEIs)	Quantity
Private HEIs with university status	51
Private HEIs with university status (branch campus of foreign university)	10
Private HEIs with university college status	39
Private HEIs with college status	335
TOTAL	435

(*Updated 31 March 2021*)
Source: Jabatan Pendidikan Malaysia, 2021

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Table 7.13: Student enrolment in public universities and private HEIs in 2019

	Total Enrolment*	PhD's enrolment	Master's enrolment	Bachelor Degree's enrolment
Public universities	567,625	36,329	56,989	350,102
Private HEIs	633,344	8,165	33,114	313,214
TOTAL	1,200,969	44,494	90,103	663,316

**Total enrolment including enrolment of PhD, Master, Bachelor Degree, Postgraduate Diploma, Diploma and other relevant programme offered by the* public universities and private HEIs.
Source: Ministry of Higher Education, 2020

Table 7.14: Number of lecturers in universities and private HEIs in 2019

	Professors	Associate Professors	Lecturers
Public universities	1,945	4,753	22,502
Private HEIs	601	1,006	19,278
TOTAL	2,546	5,759	41,780

Source: Ministry of Higher Education, 2020

The preschools, primary schools, secondary schools and tertiary education are considered as formal education. According to Coombs et al. (1973), in general there are 3 different types of education:

> Formal education: the hierarchically structured, chronologically graded 'education system', running from primary school through the university and including, in addition to general academic studies, a variety of specialised programmes and institutions for full-time technical and professional training.
>
> Informal education: the truly lifelong process whereby every individual acquires attitudes, values, skills and knowledge from daily experience and the educative influences and resources in his or her environment – from family and neighbours, from work and play, from the marketplace, the library, and the mass media.
>
> Non-formal education: any organised educational activity outside the established formal system – whether operating separately or as an important feature of some broader activity – that is intended to serve identifiable learning clienteles learning objectives.

As far as water resource management is concerned, the topics related to water have been incorporated into school curriculum. This means that the topics related to water are already in the formal education. In preschools, students learned on the topic 'Saya dan Alam Sekitar', where students have to find water related information from media, prepare scrapbook related to the cycle of rainwater, discuss about daily water use and how to save water, as well as issues related to water, such as drought, flood, water shortage, water pollution and water treatment. In primary school, the syllabus of Science in Standard 2 has incorporated the topic of 'Bumi dan Air', where students need to identify natural water resources such as rainwater, river, lake and sea, as well as to understand the water cycle. In secondary school, the syllabus of Science in Form 1 has incorporated the topic of 'Sistem dan Struktur Bumi', students will learn about water distribution on earth, including surface water and ground water and their risks. In Form 4 and Form 5, the secondary school students will learn about environmental sustainability, wastewater management, product lifecycle and environmental pollution. In addition, students will also learn water contaminated by domestic wastes.

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Although the school curriculum has incorporated topics related to water are already in the formal education, relevant activities outside the formal education is still very limited, and most of the time these activities are non-structured and ad-hoc. These activities are crucial to bring students on the ground and explore the knowledge that could not found in the textbook. These activities served as a non-formal education and one of the methods under the non-formal education is by carrying out Project-Based Learning (PBL) activities. In general, PBL activities is a teaching method where students learn by hands-on and actively engage in project that dealing with the issues in the real world. The PBL activities that related with water are limited, and there is no proper platform to capture and document these activities for teaching and learning purpose.

Besides PBL, topics related to water can also be incorporated into co-curriculum activities in school. This includes co-curriculum activities related to sports, associations, clubs and uniform bodies, where these platforms allow students to apply the knowledge, skills and values that are related to water and the environment. Through the co-curriculum activities, students can gain knowledge and skills via hands-on or practical experiences. Some of the co-curriculum entities in schools are such as:

a. *Kelab Alam Sekitar/Kelab Pencinta Alam Sekitar*
b. *Kelab Lestari Alam*
c. *Kelab Renjer Sungai*
d. *Persatuan Geografi/Sejarah*
e. *Persatuan Pendidikan Sivik/Moral*
f. *Pengakap*
g. *Pandu Puteri*
h. *Kadet Remaja Sekolah*
i. *Kadet Polis*

The topics that are related to sustainable water resource management can also be incorporated during the weekly school assembly at primary and secondary schools. Selected topics can be shared amongst the students and teachers, whereby examples of these topics are such as water resources, water management, environmental conservation and protection. Besides, the schools should also establish strategic collaboration with stakeholders, such as the ministry, private sectors, media, community and PIBG (Persatuan Ibu, Bapa and Guru). Various activities can be conducted, this includes Hari Bumi, Hari Air Sedunia, Hari Alam Sekitar, and Hari Kitar Semula.

Based on the discussion above, the framework for Academia is shown in **Figure 7.20**, where the emphasis is place on formal and non-formal education across preschools, primary school, secondary school and tertiary education.

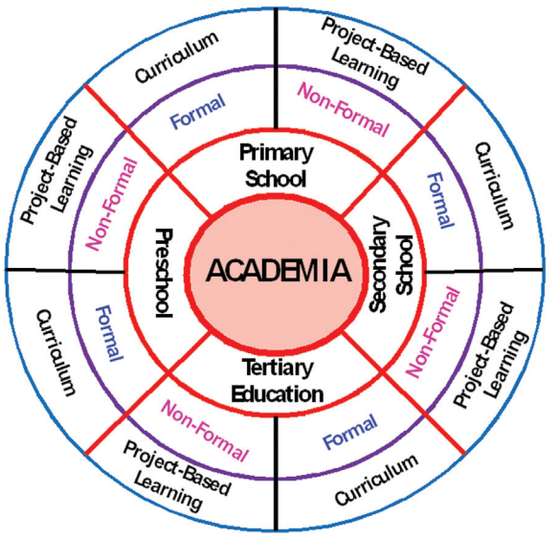


Figure 7.20: Framework for Academia

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7.4.2 Stakeholder's Engagement for Academia Cluster

A total of 11 stakeholders' engagement has been conducted in developing the WST2040 AACB Academia cluster roadmap as illustrated in **Table 7.15** below:

Table 7.15: Number of lecturers in universities and private HEIs in 2019

Stakeholders Engagement	Dates	Physical/ Hybrid/ Online	Main Findings
2nd Online Workshop on Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Sub-Sector (AACB Sub-Sector) – Module Development	13 January 2021	Online	1. Attitudes and knowledge are important parts that need to be given attention for the schools and educational. 2. Need to choose specific waters, specific group of people to work on improving the waters, business operation or management related to water. 3. It should be a cross sectional project and the ranger programme sounds good, cross sectional and multi-dimensional and need to be revived to enhance it. 4. Suggest that KPT maybe can introduce field work or outdoor based learning for each environmental subject. 5. Emphasising on data collection such as citizen science approach and the data validity may be contestable, but the trend or pattern on water quality is what need to highlight.
Received email from Dr. Shamsudin bin Mohamad Ketua Unit Sektor Penyelidikan dan Penilaian bahagian Perancangan dan Penyelidikan Dasar Pendidikan Kementerian Pendidikan Malaysia	25 February 2021	Email	Inputs of the Curriculum Development Division Regarding the Discussion Session for the Study Development of the National Agenda Roadmap for the Transformation of the National Water Sector 2040 (WST2040) 1. Sector: _Preschool_ 2. Sector: _Bahasa dan Kesusasteraan (SBK) 3. Sector: Kesenian dan Kesihatan
Discussion with Ministry of Education on AACB Academia Module Cluster Kementerian Pelajaran Malaysia (KPM) 1. Dr. Shamsudin Bin Mohamad - Ketua Unit, Kementerian Pendidikan Malaysia 2. Norhaziruldin bin Ibrahim - Penolong Pengarah, Kementerian Pendidikan Malaysia 3. Puan Rosezelenda Binti Abdul Rahman - Principal Assistant Director, Ministry of Education Malaysia	2 March 2021	Online	1. Re-emphasising the 'Hands On' activity where students will learn in the 'Project Based Learning' project that will be done in the river with the teacher to do activities to know the river, study the river or take care of the river. 2. Involve activities such as water resources management can go through the Co-curricular Sports and Arts Division where is this part that involves a lot of student activities during the co-curriculum. Examples are the Environment club, the Geography Club, the History Club, and some other clubs. 3. Syllabus for school students is too much and if the ministry wants to include the module is not mandatory and only as a guide to be used with teachers and will not teach directly to students because it should empower about the added value. 4. Sekolah Menengah Agama Miri Sarawak has conducted a programme similar to that in Japan, which is to put koi fish in drains and students clean the school toilets themselves to teach the value of integrity to water cleanliness. Suggest that it can be used as a benchmark.

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Stakeholders Engagement	Dates	Physical/ Hybrid/ Online	Main Findings
Discussion with Ministry of Higher Education on AACB Academia Module Cluster 1. Dr. Wan Nor Aisyah - Kementerian Pengajian Tinggi (KPT) 2. Puan Nor Rashidah Binti Musa - Jabatan Pendidikan Tinggi (JPT) 3. Puan Amnah - Jabatan Pendidikan Tinggi (JPT)	3 March 2021	Online	1. Department of Higher Education (JPT) there are related subjects related to water in certain study programmes. For the Polytechnic, there is a Polytechnic that runs the Environmental Engineering programme, namely the Sultan Idris Shah Polytechnic. 2. IPTS level based on the statistics until 30 December 2020 and 3 IPTS that offer water - related courses. 3. Suggest seeing the activities of the Environment club activities and they may also be there doing activities such as those related to water.
Discussion with National Union of the Teaching Profession (NUTP) on AACB Academia Module Cluster Azmi Ahmad Sapian - National Union of Teaching Profession (NUTP)	4 March 2021	Online	NUTP give response that the topic been discussed are outside field and cannot interfere with the syllabus.
Webinar on "Promoting Sustainable Water Resource Management in Universities" 1. Dr. Vivien Yew Wong Chin Senior Lecturer, Faculty of Social Sciences and Humanities, UKM 2. Dr. Mohd Yusoff Ishak Faculty of Forestry and Environment, UPM	26 April 2021	Online	1. Twinning/pairing programme with other universities will escalate the progress in terms of knowledge gained as well as achieving the goals of practicing sustainable water management. For example: UPM working closely with Shiga University to adopt the technologies and learn from each other. 2. The first establishment of a seawater desalination plant in Malaysia can be found in Bachok, Kelantan, which began operations in April 2018. Although the plant is developed at a small scale, local community believe that the desalination plan can solve the water crisis in the area that has lasted for 45 years. 3. Water pollution in Selangor rivers occurred at least four times this year and has caused water supply disruption for over 1 million consumers in the Klang Valley each time. 4. Suggest having own mineral water in campus example our Hutan Pendidikan Alam in UKM or UPM campus, Hutan Simpan Puchong. 5. Suggest turning the awareness activity to Social Entrepreneurship.
Stakeholder Validation workshop for the AACB Water Sector Transformation 2040 (WST2040) training module' 1. Kementerian Pelajaran Malaysia (KPM) 2. Kementerian Pengajian Tinggi (KPT) 3. Jabatan Pendidikan Tinggi (JPT) 4. National Union of Teaching Profession (NUTP) List of attendees 1. Hasni Kadir - BPPDP Kementerian Pelajaran Malaysia (KPM) 2. Norzahiruddin - Kementerian Pelajaran Malaysia (KPM)	19 July 2021	Online	1. There is a worksheet for school children and maybe we have already informed when we want to use this module for this water subject, it will cross the curriculum and will go through the co-curriculum so maybe the curriculum section will also give suggestions on how to implement at the operational level, later. 2. Teacher should be the Trainer of Trainer (TOT) so that there is responsibility and can be an advocate for students. And maybe the module can be uploaded anywhere on the website and inform us so that it is easy to access and find. 3. Creating a 'Sungai Angkat' to the community and schools can be involved once makes the programme even better and more successful.

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Stakeholders Engagement	Dates	Physical/ Hybrid/ Online	Main Findings
3. Rosezelenda - Kementerian Pelajaran Malaysia (KPM) 4. Abd Rahman - Kementerian Pelajaran Malaysia (KPM) 5. Juliana - Jabatan Pendidikan Tinggi (JPT) 6. Nor Rasyidah Bahar - Jabatan Pendidikan Tinggi (JPT) 7. Tee Weng Meng - National Union of Teaching Profession (NUTP) 8. Dr. Yusoff - Universiti Putra Malaysia			4. For KPM Education TV there is a broadcast about the Environment, water, and forests that can be done in the classroom and outside the classroom. Involves primary school, secondary school and even upper secondary. For subjects that can be included in the topics of water, namely Science, Geography, Biology, Islamic P., P. Moral, Design Bahasa Melayu, English, Civics and Physical Education. 5. There is social micro learning where students go out and give views about the river or the importance of the river in social media applications such as TIKTOK, IG and YouTube. 6. DID has a UNESCO secretariat and has held a Water Leadership Care Camp where there are 40 agencies, IPT, Primary, Secondary and community schools. And we have made a camp where there are 12 modules that have been provided. Amongst them, Water and Man, Water and Forest, Wetland, Nuclear Determination, Water and Soil. 7. Students exposed to DIY can be exposed from the early of primary school students to some extent knowledge and help them to be grateful about water.
Received email from Rosezelenda Abdul Rahman Principal Assistant Director Education Policy Development Sector Educational Planning and Research Division Ministry of Education Malaysia	20 July 2021	Email	Any module developed for use by teachers of the Ministry of Education Malaysia either as a reference or guide must first go through the following process: 1. The module is evaluated by the Educational Resources and Technology Division (BSTP) and the Curriculum Development Division (BPK); and 2. The Agency shall submit and present in the MOE Top Management Meeting for the approval of the meeting members.
Received email from Norhaziruldin Bin Ibrahim *Penolong Pengarah* *Unit Geografi dan Pendidikan Alam Sekitar* *Sektor Sains Sosial* *Bahagian Pembangunan Kurikulum* *Kementerian Pendidikan Malaysia*	30 July 2021	Email	1. Suggestion for improvement to the module from *Curriculum Development Division Implementation* i. Curriculum ii. Co-curriculum (involving Sports, Co-curriculum and Arts Division) iii. School assembly (involving the Daily School Management Division) iv. School programmes 2. Training of Trainers (TOTs) (involves the Teacher Professionalism Division) 3. Module AACB
Pilot testing on Academia Module Presentation of the module Academia (power point) by Prof Madya Dr. Goh Choo Ta and discussion and suggestion by all attendees. 1. Assoc. Prof. Dr. Tan Ling Ling, Lestari UKM 2. Dr. Sharina Abdul Halim, Lestari UKM 3. Dr. Murnira Othman, Lestari UKM	15 September 2021	Online	1. Assoc. Prof. Dr. Tan Ling Ling comment that student from preschool has been educated about water awareness through primary school, secondary school and universities could effectively help nation's way to reduce water stress problem. 2. Japan uses a good education way to train their behavioural of people since there are young to get people more cleanliness culture and end up Japan people more highly hygiene and good habit until

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continued

Stakeholders Engagement	Dates	Physical/ Hybrid/ Online	Main Findings
			recognised by the world as the cleanliest country in the world. 3. This training module will be good to start to educate our people. 4. Dr. Murnira Othman said the model of climate change in the module is more interested to students. 5. Dr. Sharina Abdul Halim said the module incorporate two fundamental item which are a. Water accountability – demonstrate through the utilisation of that culture. Incorporate the idea of everyone will be accountable. b. Water responsibility – show the management of the aspect of IWRM. 6. Teachers have to breakdown to the student level to be able comprehend through the three different stages which is basic, intermediate, and advance. The stages need to clearly define in the training. 7. Cannot use water as core and need to be synergy with others but not complicated.
Habibah binti Salim Assistant Director STEM Research and Development Unit (National STEM Centre) Educational Planning & Research Division Ministry of Education Malaysia	21 September 2021	Email	Received email of suggestion for improvement in the strategy and roadmap proposed in the module. **Strategy 1: Reiterate importance of rivers as water resources for human and the environment** Train and retrain teachers on activities that are related to water resource management. (People) BPG - Planning and conducting structured teacher professional development for in-service teachers based on the guidebook or teacher professional development module on water sustainability by ASM. (People) IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers Training (People) Professional development programme to familiarise teachers with climate science, active pedagogy, and project design. (People) Develop teachers' professional development workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation. (Governance) Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teachers' professional development. (Governance) Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP). (Governance) Develop a water and climate literacies assessment instrument. (Information and RDCI)

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Stakeholders Engagement	Dates	Physical/ Hybrid/ Online	Main Findings
			Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model. (Information and RDCI) Example: Sustainable Schools Programme - Environmental Award. (Information and RDCI) Expand digital platforms/tools for teaching and learning. (Infrastructure and Technology) Develop simulation-based games, mobile platforms, virtual environments, and augmented reality tools to heighten curiosity and increase learner engagement. (Infrastructure and Technology) Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively. (Infrastructure and Technology) Establish one-stop educational resources and activities on water and climate change in Digital Educational Learning Initiatives Malaysia (DELIMa) platform. (Infrastructure and Technology) **Strategy 2: Inculcation of local values in promoting sustainable water resources management** Train and retrain teachers on activities that are related to water resource management. (People) BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM. (People) IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers Training (People) Compile local and international case studies on the best practices of river/water management and climate change adaptation. (Governance) Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making. (Information and RDCI) Establish a single, searchable, user-friendly online resource for finding water - and climate-related education programmes and resources and funding opportunities as well as to showcase the project-based learning (PBL) activities that were conducted by schools (using a new or enhanced platform). (Infrastructure and Technology)

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7.4.3 The Roadmap for Academia

By taking into account current situation in Malaysia, as well as inputs from the stakeholders, the AACB would like to propose 3 strategies under the academia cluster, as below:

1. Reiterate importance of rivers as water resources for human and the environment.
2. Inculcation of local values in promoting sustainable water resources management.
3. Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management.

Strategy 1: Reiterate importance of rivers as water resources for human and the environment

The topics related to water have been incorporated into school curriculum, this includes the syllabus of preschools, primary and secondary schools. This means that the topics are related to water have already been part of the formal education. However, it is possible that students might have forgotten or still not aware that water is actually come from the rivers. Water from the tap is actually obtained from the river and it was treated before deliver into our house (**Figure 7.21**). Hence, when teaching topics that are related to water in schools, teachers should reiterate the importance of rivers as water resources for human and the environment. In this regard, teachers should be trained and retrained, where they should learn more case studies related to river management, thus they can share these case studies with students when teaching water related topics in the syllabus.



Figure 7.21: Water from the tap is actually obtained from the river and it was treated before deliver into our house.

On the other hand, there is a need to prepare a guidebook on water sustainability that could be used by students from primary and secondary schools in Malaysia. The proposed guidebook on water sustainability will place emphasis on water resources, water related hazards/disaster, water management, water pollution, and other topics. This guidebook is based on thematic area of water that cross-cut different fields or disciplines, such as geology, hydrology, science and technology, and socioeconomics. In order to prepare the guidebook on water sustainability, reference can be made to a guidebook published by Ministry of Education in 2016,

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entitled 'Buku Panduan Kelestarian Global'. This guidebook is used by teachers in teaching and promoting global sustainability.

In school, it is proposed to establish an information corner in school's library that is related to water. In this dedicated information corner that focussing on water, the librarian with the assistance from students and teachers can prepare information sheets that could enhance awareness amongst the students on the importance of sustainable water resource management. The information sheets can include, for example, what will happen if the rivers are contaminated; status of river quality in Malaysia; the operation of water treatment plant. Besides, with the advancement of the technology, nowadays information can easily be made available via internet. Hence, it is proposed that online education tools (such as application and/or gamification) that are related to water should be established. These online education tools served as interactive and attractive platform to engage and educate students on topics that are related to water.

By referring to the 12th MP, it is stated that a strong TVET (Technical and Vocational Education and Training) ecosystem is one of the key catalysts in Malaysia socio-economic development. A strong TVET ecosystem will be a game changer that will create future-ready talents in meeting industry demand. In this regard, there is a need to incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers.

As far as the financial resource is concerned, all the activities proposed above required financial support from the government. **Table 7.16** shows the roadmap and the proposed budget for the strategy - Reiterate importance of rivers as water resources for human and the environment.

Table 7.16: Roadmap and the proposed budget for the strategy - Reiterate importance of rivers as water resources for human and the environment

Strategy 1: Reiterate importance of rivers as water resources for human and the environment

Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
People	Train and retrain teachers on activities that are related to water resource management. Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teacher professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM.	KASA	211,570 teachers 12MP: 21,157 teachers 13MP: 42,314 teachers 14MP: 63,471 teachers 15MP: 84,628 teachers	Teachers' Training RM10,578,500 (0.5 day training/ RM50 for half day) 12MP: RM1,057,850 13MP: RM2,115,700 14MP: RM3,173,550 15MP: RM4,231,400	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia
	Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training (8is - Interaction, Intellectual Capital)		140 trainers	Training of Trainers RM40,000 12MP: RM10,000 13MP: RM10,000 14MP: RM10,000 15MP: RM10,000	Train 140 trainers

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Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
	Professional development program to familiarise teachers with climate science, active pedagogy and project design. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the teaching module on climate education. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training (8is - Interaction, Intellectual Capital)	KASA	23,360 teachers 12MP: 5,840 teachers 13MP: 5,840 teachers 14MP: 5,840 teachers 15MP: 5,840 teachers	Teachers' Training RM1,401,600 (12 hours training) 12MP: RM350,400 13MP: RM350,400 14MP: RM350,400 15MP: RM350,400	Train 23,360 teachers
			80 trainers	Training of Trainers RM40,000 12MP: RM10,000 13MP: RM10,000 14MP: RM10,000 15MP: RM10,000	Train 80 trainers
Governance	Develop teachers' professional development workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation. (8is - Integrity, Institution)	KASA	The content for the module and pedagogical activities are developed during 12 MP.	RM20,000	
	Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teachers' professional development. (8is - Integrity, Institution)	KASA	The pedagogical resources are developed during 12 MP.	RM20,000	
	Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP) (8is - Integrity, Institution)	KASA	The courses are developed and offered in 12 MP.	RM20,000	
	Incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers. (8is - Integrity, Institution)	KASA	Relevant TVET programmes have been revised in 12 MP.	RM1,000,000	
Information and RDCI	Develop a water and climate literacies assessment instrument (8is - Infostructure)	KASA	The instrument is developed during 12 MP.	RM20,000	

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Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
	Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model (8is - Infostructure)	KASA	8,220 schools 12MP: 822 schools 13MP: 1,644 schools 14MP: 2,466 schools 15MP: 3,288 schools	RM822,000 (RM100 per school) 12MP: RM82,200 13MP: RM164,400 14MP: RM 46,600 15MP: RM328,800	The WST2040 should cover 50% of the total schools (16,440) in Malaysia
Infrastructure and Technology	Expand digital platforms/tools for teaching and learning Develop simulation-based games, mobile platforms, virtual environments, and augmented reality tools to heighten curiosity and increase learner engagement. (8is - Infrastructure)	KASA	The online education platforms/tools are developed during 12 MP.	RM1,000,000	
	Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively. (8is - Infrastructure)	KASA	2,445 secondary schools	RM104,108,100 12MP - 15MP: Green House: RM92,910,000 Water Distillation Equipment: RM5,085,600 Meteorological Station: RM6,112,500	Involving 2,445 secondary schools
	Establish one-stop educational resources and activities on water and climate change in Digital Educational Learning Initiatives Malaysia (DELIMa) platform. (8is - Infrastructure)	KASA	The one-stop platform is developed during 12 MP.	RM1,000,000	All schools can access the educational resources and activities in DELIMa.
Finance	The financial support is needed for the programmes proposed above. Please refer to respective programme for the detailed budget.				

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Strategy 2: Inculcation of local values in promoting sustainable water resources management

Although topics related to water have been incorporated into school curriculum, there is a need to link the knowledge that they learnt from the book with the real world. Students should appreciate their surrounding environment (**Figure 7.22**). In this regard, teachers can carry out water related activities together with students, such as via project-based learning (PBL) activities, as part of the initiatives under non-formal education. Hence, teachers should be trained and retrained on potential activities that are related to water resource management. These activities will place emphasis on the local setting, such as information on the rivers that are near to their school, local initiatives in river protection and cleaning, local entities that are responsible to manage the rivers. In addition, the Ministry should also compile local and international case studies on the best practises of river/water management, and then share these case studies throughout Malaysia.

When conducting PBLs, teachers and students are expected to collect local data. This data includes the nearest river to the school, water quality data of the river, information on the flora and fauna near the river, land use, meteorological data and other relevant data. Once this data is made available, the schools can set up a dedicated resource centre for the river nearest to their school. Besides, teachers can consider establishing website to showcase the PBL activities that were conducted. The website can be incorporated into the schools' website to reduce cost and to ease maintenance.

As stated in the 12th MP, TVET in Malaysia will be enhanced in order to prepare TVET graduates that are capable in meeting industry demands. In this regard, the collaboration and cooperation between TVET and industry should be strengthened. This include having more sessions or platforms for industry to share their experiences and expectations with the TVET students.

As far as financial resource is concerned, all the activities proposed above, required financial support from the government. **Table 7.17** shows the roadmap and the proposed budget for the strategy – Inculcation of local values in promoting sustainable water resources management.



Figure 7.22: Students should appreciate their surrounding environment

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Table 7.17: Roadmap and the proposed budget for the strategy - Inculcation of local values in promoting sustainable water resources management

Strategy 2: Inculcation of local values in promoting sustainable water resources management

Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
People	Train and retrain teachers on activities that are related to water resource management. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teaching module by ASM. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training (8is - Interaction, Intellectual Capital)	KASA	211,570 teachers 12MP: 21,157 teachers 13MP: 42,314 teachers 14MP: 63,471 teachers 15MP: 84,628 teachers	Teachers' Training RM10,578,500 (0.5 day training/ RM50 for half day) 12MP: RM1,057,850 13MP: RM2,115,700 14MP: RM3,173,550 15MP: RM4,231,400	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia
Governance	Compile local and international case studies on the best practices of river/ water management and climate change adaptation. (8is - Integrity, Institution)	KASA	The case studies on the best practises of river/water management are compiled during 12 MP.	RM20,000	Establish a committee to compile local and international case studies on the best practises of river/water management
	Strengthen collaboration and cooperation between TVET and industry, where more sessions or platforms for industry to share their experiences and expectations with the TVET students will be established (8is - Integrity, Institution)	KASA	Sessions or platforms for industry to share their experiences and expectations with the TVET students have been established in 12 MP.	RM1,000,000	
Information and RDCI	Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making. (8is - Infostructure)	KASA	8,220 schools 12MP: 822 schools 13MP: 1,644 schools 14MP: 2,466 schools 15MP: 3,288 schools	RM822,000 (RM100 per school) 12MP: RM82,200 13MP: RM164,400 14MP: RM246,600 15MP: RM328,800	The WST2040 should cover 50% of the total schools (16,440) in Malaysia

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continued

Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
Infrastructure and Technology	Establish a single, searchable, user-friendly online resource for finding water- and climate-related education programmes and resources and funding opportunities as well as to showcase the project-based learning (PBL) activities that were conducted by schools (using a new or enhanced platform). (8is - Infrastructure)	KASA	The online platform is developed/ enhanced during 12 MP.	RM1,000,000	
Finance	The financial support is needed for the programmes proposed above. Please refer to respective programme for the detailed budget.				

Strategy 3: Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management

Unlike preschools, primary and secondary schools, the higher education institutions (HEIs), either public or private, will determine and develop relevant curriculum for their undergraduate and postgraduate programmes. If the programmes are being recognised and accredited by professional bodies, such as engineering and medical programmes, then the HEIs must comply with all the requirements set by professional bodies. On the other hand, for those programmes that are not being monitored by professional bodies, then the HEIs will take their own initiatives to develop the programme. The programmes will then to be approved by Ministry of Higher Education and accredited by Malaysian Qualification Agencies (MQAs).

The HEIs offer programmes in various fields and disciplines, this includes the STEM (Science, Technology, Engineering and Mathematic), economics, social sciences, laws, arts and humanities. The topics related to water resources management might be one of the topics in the programmes offered by HEIs, however, it is challenging to find out which programmes that have incorporated topics related to water resources management as there is no central body that compile and consolidate the courses taught under these programmes. Furthermore, according to the requirement of Ministry of Higher Education and MQAs, these programmes have to be revised after certain timeframe to ensure the programmes are up-to-date and it is relevant to current development. In this regard, there is a need to train lecturers on topics and activities that are related to water resource management. The topics such as Integrated Water Resources Management (IWRM), Integrated Lake Basin Management (ILBM), Integrated River Basin Management (IRBM), and other relevant topics. The topics can also relate to the water issues that are encountered in Malaysia (**Figure 7.23**). In addition, lecturers can also compile success stories related to water resources management in HEIs (public and private) and share it throughout Malaysia.

In HEIs, it is believed there are numerous water resources experts. However, there is no platform to compile the contacts of these experts, and their relevant expertise. Hence, there is a need to establish a database of resource persons in the field of water resource management. Besides, an interactive tool can also be established whereby this tool can create a platform for interactive communication between HEIs (public and private) and public.

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In order to strengthen the local knowledge, there is a need to strengthen RDCI (Research, Development, Commercialisation and Innovation) that are related to water resource management in Malaysia. The Government should mainstream water resource management as one of the priority research areas in RDCI, and then to provide and sustain adequate research funding to researchers in Malaysia. The research can encompass both fundamental research (e.g. establish theoretical framework that support IWRM) and application research (e.g. establish rainwater harvesting system).

Researchers at HEIs have vast experience in research, training and consultation, hence they should share their expertise with stakeholders, namely government, industry and community. For government, researchers can provide technical inputs as subject matter experts (SMEs) to government officers, as well as to represent Malaysia or assist government officials in international and regional negotiations. Besides, researchers can also become the memory keeper for the relevant ministry/agency to ensure sustainable knowledge transfer. For industry, researchers can work closely with professional bodies to provide professional training courses or become consultants/technical advisors to selected industries. As far as community is concerned, researchers can take the leadership and proactive measures to outreach to the communities. Besides, researchers can also promote the concept of citizen science to enhance community engagement in sustainable water resources management.

As far as financial resource is concerned, all the activities proposed above, required financial support from the government. **Table 7.18** shows the roadmap and the proposed budget for the strategy – Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management.



Figure 7.23: Water issues that are encountered in Malaysia

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Table 7.18: The roadmap and the proposed budget for the strategy – Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management.

Strategy 3: Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management

Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
People	To train lecturers on topics and activities that are related to water resource management. (8is - Interaction, Intellectual Capital)	KASA	25,043 lecturers 12MP: 2,504 lecturers 13MP: 5,008 lecturers 14MP: 7,513 lecturers 15MP: 10,018 lecturers	RM2,504,300 (1-day training/ RM100 for 1 day) 12MP: RM250,400 13MP: RM500,800 14MP: RM751,300 15MP: RM1,001,800	The WST2040 should cover 50% of the total lecturers (50,085 that includes professor, associate professor and lecturers) in Malaysia
Governance	To compile success stories related to water resources management in HEIs (public and private) (8is - Integrity, Institution)	KASA	The success stories are compiled during 12 MP.	RM20,000	Establish a committee to compile success stories related to water resources management in HEIs (public and private)
Information and RDCI	To establish a database of resource persons (from public and private HEIs) in the field of water resource management (8is - Infostructure)	KASA	The database is established during 12 MP.	RM50,000	The database is made available online.
	To mainstream water resource management as one of the priority research areas in RDCI. (8is - Infostructure)	KASA	10 projects for each Malaysia Plan (MP)	RM20 million for each Malaysia Plan (MP)	The funding will be provided by Government
	Researchers' outreach to government agencies. (8is - Infostructure)	KASA	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)	The funding will be provided by Government
	Researchers' outreach to industry. (8is - Infostructure)	KASA	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)	The funding will be provided by Government
	Researchers' outreach to community. (8is - Infostructure)	KASA	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)	The funding will be provided by Government

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continued

Focus Area	Programmes	Lead Authority	Targets	Proposed Budget	Remarks
Infrastructure and Technology	To establish an interactive tool that encourage interactive communication between HEIs (public and private) and public (8is - Infrastructure)	KASA	The interactive tool is established during 12 MP.	RM200,000	The interactive tool can be used in different platforms, such as Windows, Mac, Android, iOS, and etc.
Finance	The financial support is needed for the programmes proposed above. Please refer to respective programme for the detailed budget.				

As far as the database of resource persons is concerned, the AACB has taken the proactive initiative to compile a preliminary list of potential resource persons from 20 public universities and 5 private universities. Emails have been sent to the Dean/Directors of 93 entities, which include faculty of engineering, faculty of science and technology, faculty of earth science and environment, faculty of law, and other relevant faculties from 25 universities. Based on the email, Dean/Directors have nominated potential resource persons in the field of water management, and they have also provided the short and full CVs of the potential resource persons. The status of the preliminary list of resource person is shown in **Table 7.19**. The summary of resource persons' expertise can be found in Appendix B. With this preliminary list, EPU and ASM can now evaluate and then identify the resource persons for WST2040.

Table 7.19: Status of the preliminary list of resource person from 25 universities in Malaysia

No.	HEIs	Number of resource persons
1.	Universiti Kebangsaan Malaysia (UKM)	7
2.	Universiti Putra Malaysia (UPM)	9
3.	Universiti Malaya (UM)	7
4.	Universiti Sains Malaysia (USM)	14
5.	Universiti Malaysia Perlis (UniMAP)	3
6.	Universiti Teknologi Malaysia (UTM)	1
7.	Universiti Islam Antarabangsa Malaysia (UIAM)	2
8.	Universiti Utara Malaysia (UUM)	4
9.	Universiti Malaysia Sarawak (UNIMAS)	6
10.	Universiti Malaysia Sabah (UMS)	13
11.	Universiti Pendidikan Sultan Idris (UPSI)	2
12.	Universiti Sains Islam Malaysia (USIM)	1
13.	Universiti Teknologi MARA (UiTM)	13
14.	Universiti Malaysia Terengganu (UMT)	12
15.	Universiti Tun Hussein Onn Malaysia (UTHM)	21
16.	Universiti Teknikal Malaysia Melaka (UTeM)	3
17.	Universiti Malaysia Pahang (UMP)	1
18.	Universiti Sultan Zainal Abidin (UniSZA)	1
19.	Universiti Malaysia Kelantan (UMK)	3
20.	Universiti Pertahanan Nasional Malaysia (UPNM)	3
21.	Sunway University	3
22.	Monash University Malaysia	7
23.	Curtin University	6
24.	University of Nottingham Malaysia	4
25.	Universiti Teknologi Petronas	8
	TOTAL	154

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7.4.4 The Training Module for Academia

Under AACB, a training module attempted to develop that could train the young generation in promoting sustainable water resources. Nonetheless, to ensure training sustainability, although the ultimate purpose is to train the young generation, this module was designed to train the teachers (from preschool, primary and secondary schools) and lecturers (from higher education institutions (HEIs)) rather than students. The teachers and lecturers are the 'trainers' for the young generation, and they will spend more time in schools and HEIs compared to students. Hence, in other words, this training module is designed for Training of Trainers (TOTs). The objectives, scopes, expected output and outcomes for the training modules are as below:

A. Objectives
   - To train teachers and lecturers in the aspect of sustainable water resource management.

B. Scopes
   - Teachers (preschool, primary and secondary schools)
   - Lecturers (higher education institutions)

C. Expected Output
   - Teachers and lecturers have been trained on sustainable water resource management.

D. Expected Outcome
   - Teachers and lecturers have incorporated elements of sustainable water resource management into their classes and lectures.

Under the AACB roadmap for academia, there are 3 proposed strategies, namely:

1. Reiterate importance of rivers as water resources for human and the environment.
2. Inculcation of local values in promoting sustainable water resources management, and
3. Enhance the roles of researchers from HEIs in promoting sustainable water resources management.

The proposed strategies are mainly based on the requirement of formal and non-formal education in relation to sustainable water resource management. Hence in this training module, for the formal education, emphasis placing on the topics that are related to water resource management; whereas for non-formal education, activities related to water resource management will be highlighted. The correlation between the proposed strategies, topics (formal education) and activities (non-formal education) for teachers and lecturers is shown in **Figure 7.24.**

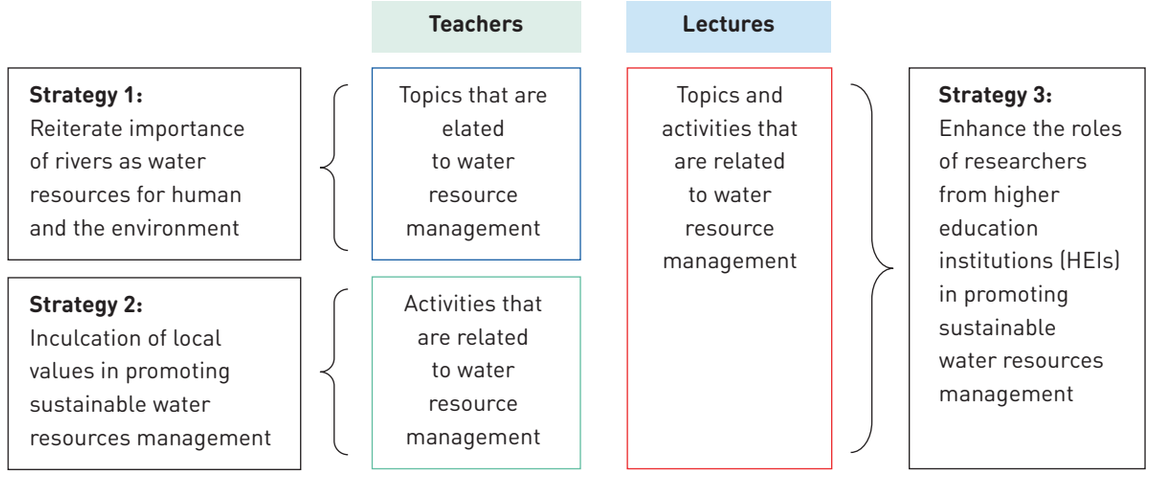


Figure 7.24: Correlation between the proposed strategies, topics (formal education) and activities (non-formal education) for teachers and lecturers.

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7.4.5 The Toolbox for Academia Module

There are many existing and available information that related to sustainable water resource management. However, this information is scattered and might not be suitable to be used directly by educators in Malaysia. Hence in the AACB training module for academia, the toolbox concept is adopted, where educators can select appropriate tools (i.e. topics and activities) from the toolbox (i.e. the training module) (**Figure 7.25**). Inside the toolbox, there are designated topics that suitable to be used as formal education, such as water and livelihood, water hazards, integrated water resources management (IWRM), integrated lake basin management (ILBM). Besides, there are also list of project-based learning (PBL) activities that can be used at preschools, primary and secondary schools, and HEIs. In order to assist users of the toolkit, the word 'educators' were used that represent teachers and/or lecturers; and the word 'students' mean preschools' student, primary schools' student, secondary schools' student and/or HEIs' student.



Figure 7.25: The toolbox for AACB academia training module

As far as the topics that related to water resource management are concerned, the training module has identified 3 different levels that can accommodate the needs of selected target audiences, namely basic, intermediate and advance levels. **Table 7.20** shows the description of each level in this training module.

Table 7.20: Different levels for the topics that are related to water resource management

Levels	Description
Basic	This level is for awareness. Educators can use the information in the teaching modules to teach their students, for example, primary schools' students. The information for the basic level should be sufficient to enhance the awareness of the target audiences.
Intermediate	This level is for capacity building. Educators can use the information in the teaching modules to teach their students, for example, secondary schools' students and university's students. The information in the intermediate level can help students to have a better understanding on selected topics.
Advanced	This level is to train potential advocators. However, due to many materials and information have been established by relevant bodies at local and international levels, thus in this training module, relevant listed materials that are available online, where educators can access these materials for further reading. In addition, educators can also contact the resource persons listed in this training module to further understand relevant topics.

Besides, although this training module was designed to train teachers and lecturers, trainers can also use this training modules to train students, as indicated in **Figure 7.26**. The mode of training includes both physical (face-to-face) training and online training.

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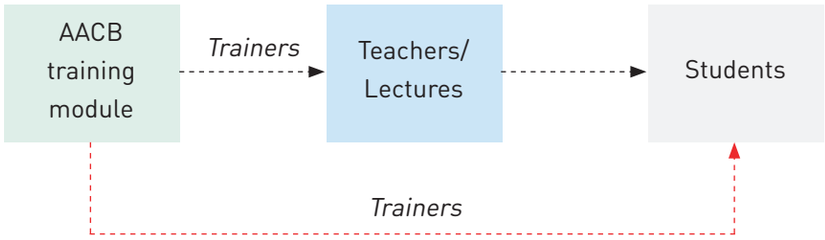


Figure 7.26: Application of AACB academia training module

As a starting point, the science teachers should be the priority group to receive training from AACB, and eventually it should cover teachers from different zones in Malaysia, namely *Zon Utara, Zon Tengah, Zon Selatan, Zon Timur, Zon Sarawak, and Zon Sabah and Labuan*. If the buy-in from the teachers are encouraging, this module can be used as reference for teachers once it has been evaluated by *Bahagian Sumber dan Teknologi Pendidikan (BSTP) and Bahagian Pembangunan Kurikulum (BPK)*, followed by approval from the management of KPM.

7.5 Importance of The People: Businesses & Industries

Prof Madya Dr. Lee Khai Ern, Prof Dato' Dr. Mazlin Mokhtar, FASc. and Siti Nur Fazreen Abdul Rahman

7.5.1 Background

The word ''Businesses'' has a broad term, for example business can be referred as profit entities or non-profit organisations that operate to fulfil a charitable mission or further social cause. ''Businesses'' also can be defined as a business or entrepreneurial entity that engages in commercial, industrial, or professional activities. While according to Investopia (online), ''Industries'' is defined as a collection of businesses that are linked by their principal business operations. There are dozens of industry classifications in today's economy. Typically, industry classifications are bundled into broader divisions known as sectors.

The AACB Team has classified the Businesses and Industries into 3 scopes as below:

i. CLUSTER A: Bursa Saham Listed Company.
ii. CLUSTER B: Industrial Park /Halal Park/ Estate Park.
iii. CLUSTER C: Businesses and industries listed under SME Corporation.

In Malaysia, there are few ministries that deal with business and industries in Malaysia. For example, the Ministry of Entrepreneur Development and Cooperatives (MEDAC) is responsible for coordinating the implementation of small and medium enterprise (SME) development programmes across all associated Ministries and organisations. It serves as a primary point of reference for SMEs and entrepreneurs for research and data distribution, as well as providing business advising services to SMEs and entrepreneurs across the country. While the Ministry of International Trade and Industry (MITI) is responsible for planning, formulating, and enforcing policies related to industrial development, international trade, and investment. By increasing bilateral, multilateral, and regional trade connections and collaboration, MITI also helps to stimulate foreign and domestic investment and promote Malaysia's manufacturing products and services exports. There are around 565,2560 businesses and industries in various sector listed under the SME Corporation (**Table 7.21**), 963 companies listed under Bursa Saham, and 247 companies listed under Industrial Park, Halal Park and Estate Park (**Figure 7.27** and **Figure 7.28**).

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Table 7.21: Details of different sector in SME

No.	Sector	Total
1	Agriculture	186,444
2	Mining	20,674
3	Manufacturing	1,039,662
4	Construction	630,063
5	Service	3,775,717
	Total	5,652,560

Source: SME Corporation, 2015

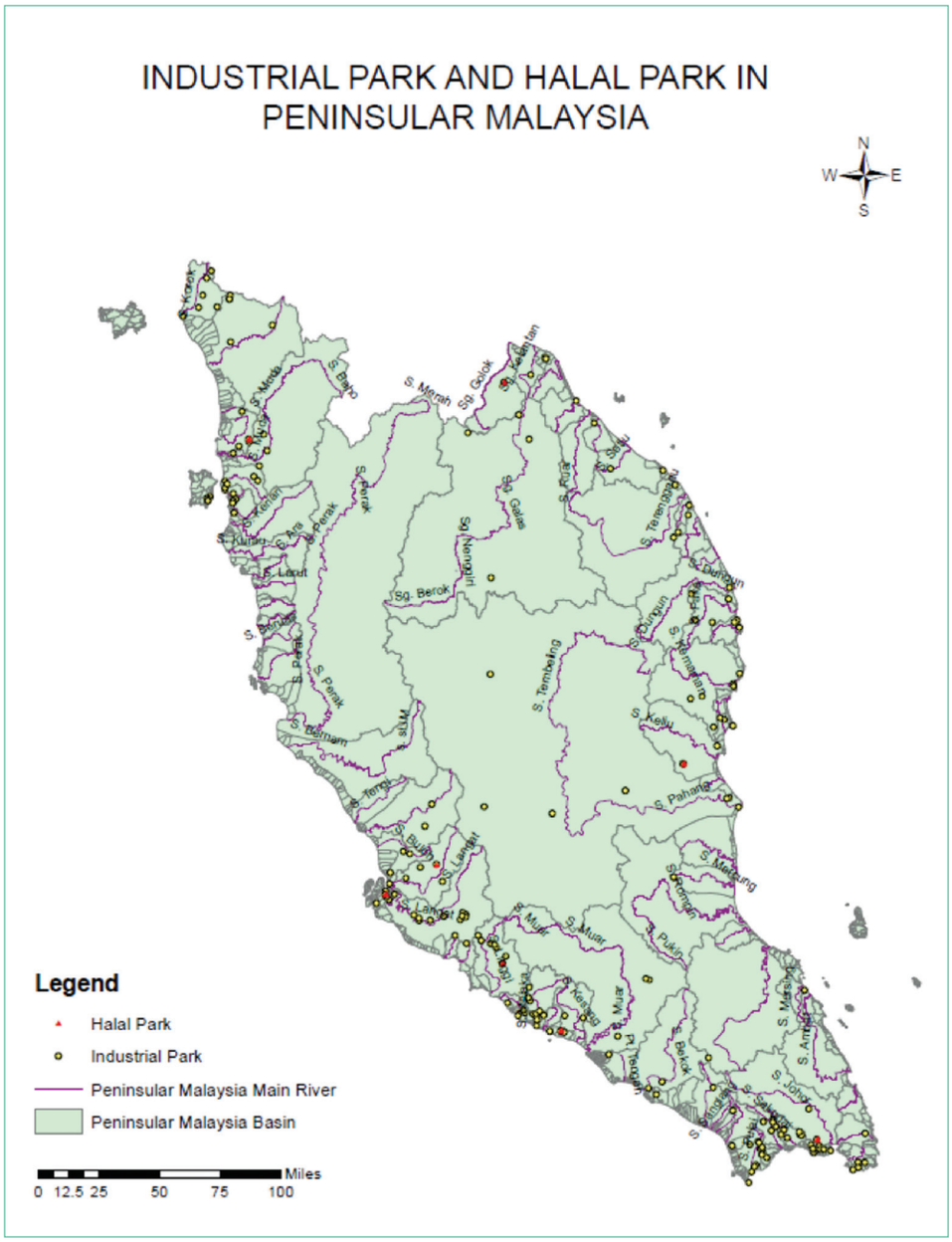


Figure 7.27: Location of Industrial Park and halal park in peninsular Malaysia

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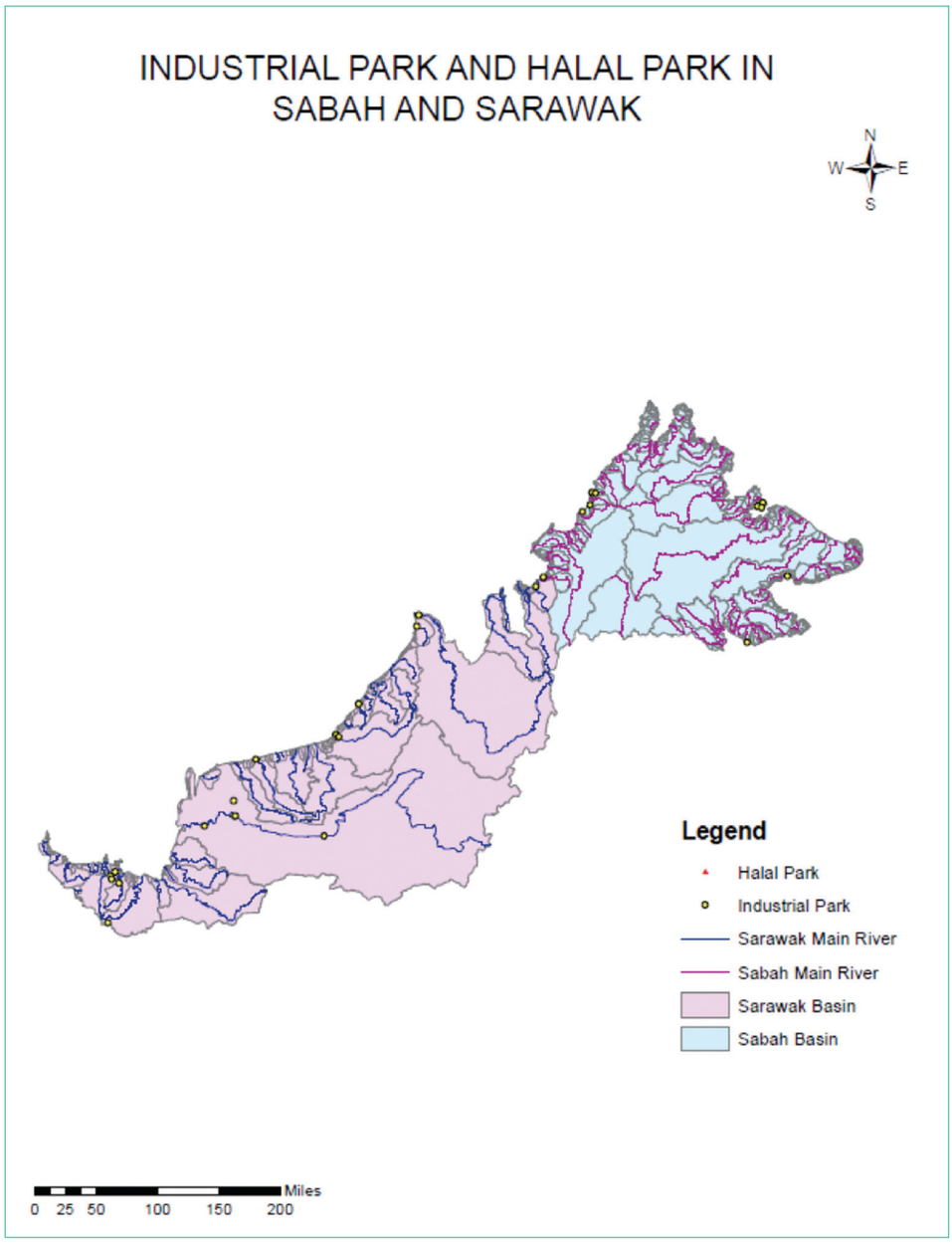


Figure 7.28: Industrial Park and halal Hub in Sabah and Sarawak

Businesses and industries entail a lot of processes, such as fabricating, processing, washing, diluting or transporting a product, whereby it involves water consumption and sanitation throughout product manufacturing and service provision. In Malaysia, the non-domestic metered water consumption has been increasing steadily in which approximately 4.72 billion litres of metered water were consumed per day for non-domestic use in 2019. **Figure 7.29** shows the non-domestic metered water consumption in Malaysia from 2012 to 2019. Some sectors use a large amount of water to produce their products, such as food, paper, chemicals, refined petroleum or primary metals, whereby water consumed by business and industry entities may come from water operators supplying from nearest water resource. **Table 7.22** shows the water consumption volume according to sectors.

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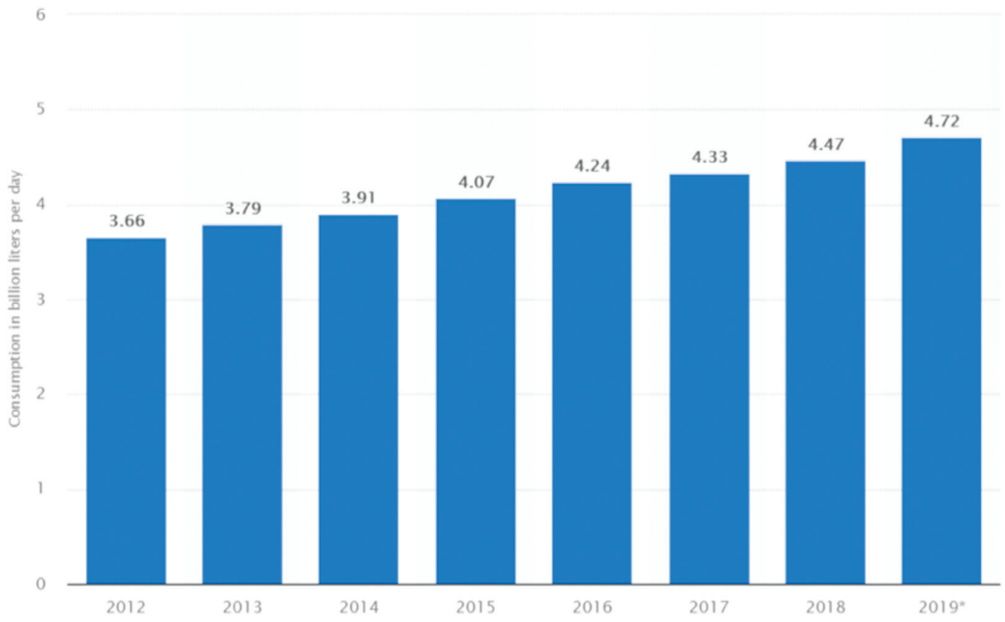


Figure 7.29: Non-Domestic Metered Water Consumption in Malaysia from 2012 to 2019

Table 7.22: Water Consumption Volume According to Sectors

No.	Sector	Water Consumption (m^3)
	Agriculture	
1	Oil Palm	872,615
2	Rubber	10,635,080
3	Livestock	117,342
4	Forestry & Logging	No data
5	Fisheries & Agriculture	2,577,381
6	Others	1,537
	Construction	
7	Civil Engineering	5,290
8	Residential Buildings	418
9	Non-Residential Buildings	No data
	Manufacturing	
10	Electrical & Electronics Products	435,877
11	Food, Beverages & Tobacco	1,458,874
12	Transport Equipment & Other Manufacturers	115,493
13	Petroleum, Chemical, Rubber & Plastic	688,484
14	Wood, Furniture, Paper Products & Printing	10,580
15	Non-metallic, Mineral Products, Basic Metal & Fabricated Metal Products	3,076,000
16	Textile, Wearing Apparel, Leather & Footwear	No data

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No.	Sector	Water Consumption (m^3)
	Mining and Quarrying	
17	Petroleum & Natural Gas	37,060,000
18	Mining (bauxite, gold, coal, iron ore, tin, ilmenite, amang retreatment & other mining)	23,772
19	Quarrying (granite, limestone, sand extraction & other stone)	1,732
	Services	
20	Wholesale & Retail Trade, Food & Beverages and Accommodation	13,500
21	Information & Communication and Transportation & Storage	335,969
22	Health, Education and Arts, Entertainment & Recreation	495,000

According to the Report of Census (2010) by the Department of Statistics, the estimated volume of wastewater generated by the municipal and industrial sectors was 2.97 billion m^3 per year. **Figure 7.30** shows the proportion of population equivalent (PE) served by various sewerage systems. According to the main sewerage operator in Malaysia, Indah Water Konsortium, the dominant wastewater treatment types in Malaysia are preliminary (removal of rags, rubbish, grit, oil and grease), primary (removal of settleable and floatable materials) and secondary treatment (biological treatment to remove organic and suspended solids). According to PRNewswire, the largest users of water treatment plants in Malaysia are from the agriculture and food sectors. Malaysian relies on agriculture as it is one of the three main standard pillars in the country's economy, followed by the oil & gas industry whereby the rising demand for oil and oil-based products has increased the demand for water treatment in this industry. Malaysia has emerged as Electronics and Latex hub, promoting large scale usage of high grade treated water in this industry. Textile, tannery, pharmaceuticals, automobile and electronics are some other key sectors that demand extensive water treatment. **Table 7.23** shows the wastewater generation according to sectors.

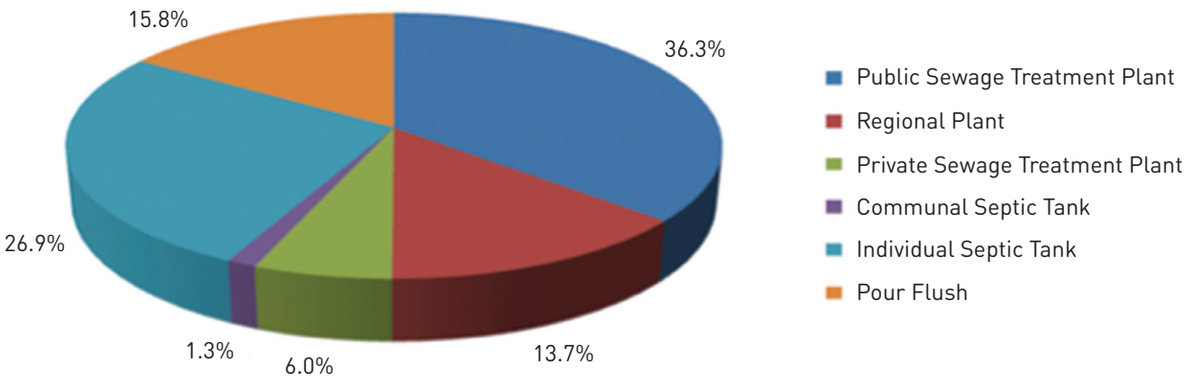


Figure 7.30: Proportion of Population Equivalent (PE) Served by Various Sewerage Systems

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Table 7.23: Wastewater Generation Volume According to Sectors

No.	Sector	Water Consumption (m^3)
	Agriculture	
1	Oil Palm	104,177
2	Rubber	2,277,850
3	Livestock	336,678
4	Forestry & Logging	No data
5	Fisheries & Agriculture	2,159,912
6	Others	756
	Construction	
7	Civil Engineering	No data
8	Residential Buildings	No data
9	Non-Residential Buildings	No data
	Manufacturing	
10	Electrical & Electronics Products	190,450
11	Food, Beverages & Tobacco	804,712
12	Transport Equipment & Other Manufacturers	No data
13	Petroleum, Chemical, Rubber & Plastic	129,699
14	Wood, Furniture, Paper Products & Printing	No data
15	Non-metallic, Mineral Products, Basic Metal & Fabricated Metal Products	471,000
16	Textile, Wearing Apparel, Leather & Footwear	No data
	Mining and Quarrying	
17	Petroleum and Natural Gas	154,000
18	Mining (bauxite, gold, coal, iron ore, tin, ilmenite, amang retreatment & other mining)	No data
19	Quarrying (granite, limestone, sand extraction & other stone)	No data
	Services	
20	Wholesale & Retail Trade, Food & Beverages and Accommodation	No data
21	Information & Communication and Transportation & Storage	330,220
22	Health, Education and Arts, Entertainment & Recreation	490,925

Figure 7.31 shows the quadrant of water consumption and wastewater generation of different sectors in Malaysia. Petroleum & natural gas, rubber & plastic and oil palm sectors are the top three water-consuming industries, however, petroleum & natural gas industries have better water efficiency with relatively lower wastewater generation. Meanwhile, fisheries & agriculture and rubber sectors have relatively lower water efficiency whereby the wastewater generations are as much as half of the water consumption or more. In this context, there is a need to implement IWRM to ensure the sustainability of water resources in Malaysia.

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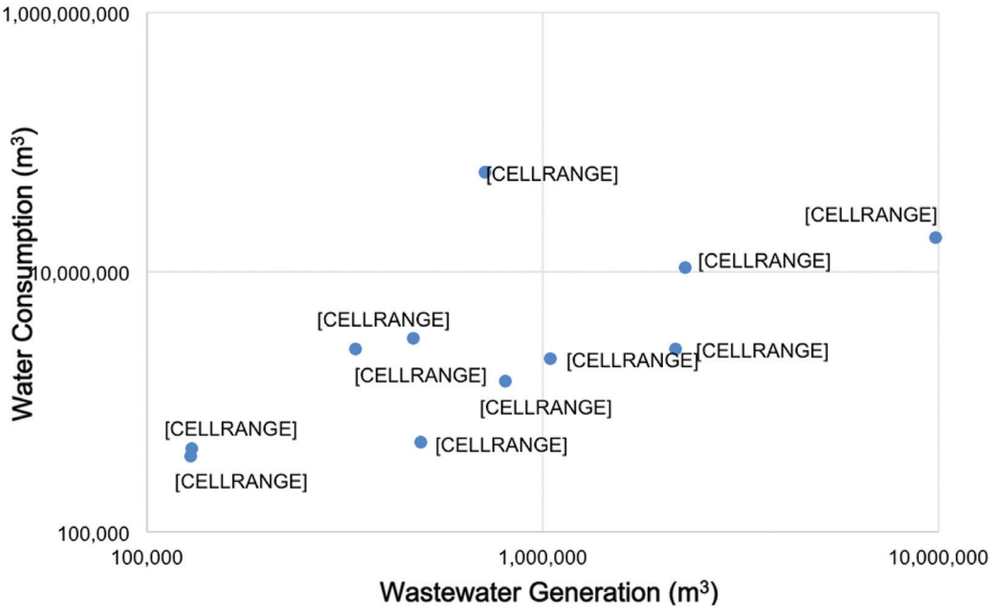


Figure 7.31: Water Consumption and Wastewater Generation (m^3) According to Sectors in Malaysia

7.5.2 Stakeholder's Engagement for Business & Industries Cluster

A total of 3 stakeholders' engagement has been conducted in developing the WST2040 AACB Academia cluster roadmap as details in **Table 7.24** below:

Table 7.24: Stakeholder's Engagement for Business & Industries Cluster

1st Online Workshop on Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Task Force (AACB SUB-SECTOR)	8th October 2020	Hybrid	For economy services in AACB, target group need to be identified, what type of ecosystem that the community have and where to receive the funding (locally and internationally)
2nd Online Workshop on Water Sector Transformation 2040 By Awareness Raising, Advocacy and Capacity Building Sub-Sector (AACB Sub-Sector) – Module Development	8th January 2021	Online	Corporate doing CSR have their own targets and it can be very specific too. How the inputs from corporates to be incorporated, also they can share their contribution to IWRM.
Webinar on The Paradigm Shift of Businesses and Industries towards Circularity in Water Management/ Integrated Water Resource Management	24th February 2021	Online	1. The private sectors not fully aware and adhere to the rules and regulations toward water security in this country and why the enforcement from the government agency is still lacking. 2. Water sectors need more investment to drive the sector. Obviously, the operators are incapable of driving it due to insufficient revenues. Establishing The State or Inter-State River Basin Water Authority (ies), as "The Single Authority" over the whole water resource protection and development within a river basin.

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7.5.3 The Roadmap for Businesses & Industries towards WST2040

The roadmap for AACB is for the implementation over a 20-year time frame spanning four five-year Malaysia Plans until 2040 (**Table 7.6**). The 12th Malaysia Plan will be the first phase of the Water Sector Transformation (WST2040) agenda which is to accelerate the implementation of Integrated Water Resource Management (IWRM) and provide a good foundation for water sector transformation. The recommended strategies have been organised according to the objectives of ensuring water security and sustainability; and promoting water as an economic opportunity. **Table 1** shows the AACB strategic plan and implementation road map.

i. People

People have been identified as the driver for WST2040 whereby it aims to empower people to drive water sector transformation. In the context of the Business & Industry cluster, human capital has been seen as the prime mover in driving AACB. To date, there are 952 companies listed under Bursa Malaysia (denoted as Cluster A), 247 companies listed under industrial parks, halal parks and estate parks (denoted as Cluster B), and 5,652,560 small and micro-business and industry establishments in various sectors (denoted as Cluster C) in which there are millions of workforces working in the business and industry sectors of Malaysia. AACB for Business & Industry cluster will cover the understanding of policy on IWRM, stakeholders involved, water cycle as well as the importance of IWRM to the people and the country.

Under the pillar of People, it is recommended for the Ministry of Environment and Water (KASA) to provide holistic 'Training of Trainers' capacity building programme for the stakeholders of the Business & Industry cluster whereby the capacity building module will include awareness-raising on demand management and how business and industry could play a role in addressing risks and environmental consequences of their operations and improving water efficiency and sustainability. It is targeted in the 12th MP for Business & Industry cluster to train the first batch of 900 personnel from Clusters A, B and C as resource persons. The number of resource persons will propagate stepwise in which the training will be conducted quarterly by KASA to ensure 100% of business and industry entities in Clusters A and B attended AACB 'Training of Trainers' programme by 15th MP. Considering a big pool of business and industry establishments in Cluster C, it is aimed to prioritise the critical sectors of Cluster C for the AACB capacity building programme.

To enhance the water management competency of business and industry, it is recommended for KASA to develop a policy in making this competency certification mandatory for business and industry. Through a star-rating system, KASA can monitor and track the adoption and implementation of the six-step principles which can create a long term ripple effect for business and industry in accelerating IWRM implementation. The targeted participants are those EHS and Sustainability Professionals of business and industry entities whereby the AACB capacity building programme will enlighten them on the implications of an illegal discharge and how to conserve water supplied to their business and industry operations. For those professional practitioners accredited by professional bodies like Board of Engineers Malaysia (BEM), Malaysia Board of Technologists (MBOT), Malaysia Green Building Council (MGBC), Malaysian Institute of Architects (PAM), etc, it is also recommended for the Ministry of Human Resources (MoHR) and Human Resource Development Corporation (HRDF) to provide Continuing Professional Development (CPD) points to encourage the professional practitioners to be equipped with IWRM knowledge and skills.

This training module is expected to deliver the means of reducing cost and risk as well as improving compliance and revenue of business and industry entities by adopting the six-step principles as the action framework (**Figure 7.32**). Through this module, the business and industry sectors can create partnerships with local

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authorities and communities in co-managing river basins and good branding for their companies through CSR initiatives. Given the current Covid-19 condition, free training gives incentive for business and industry to participate in the AACB capacity building programme.

Compliance
Strengthening water management beyond regulatory compliance.



Revenue
Increasing revenue through the six-step principles action framework.

Cost
Reducing cost through the adoption of circularity in water management

Risk
Mitigating risks related to water supplies and negative impact on the environment.

Figure 7.32: The 2C2R implications for business and industry in adopting circularity in water management

ii. Governance

The objective of the governance pillar is to strengthen the governance of the water sector at all levels. It is recommended for KASA to form a strategic partnership with business and industry and the Department of Environment (DOE) to establish a resource person directory within their regional network. Under this strategy, a public-private partnership will be formed between KASA and business and industry entities to roll out the AACB 'Training of Trainers' for business and industry whereby competent trainers trained under the AACB programme will be appointed to be resource persons for their respective zone and region. A directory of resource persons will be established and maintained by DOE and available for public access where the business and industry entities of respective zone and regions can always refer and consult the resource persons on the best management practices of water resources.

iii. Information & RDIC

The objective of the information & RDCI pillar is to enhancing data-driven decision-making for sustainability. Under this strategy, DOE will work with a communication team comprised resource persons to publish and disseminate water best management practices in business and industry through public communication means. The communication team will formulate a strategy on tracking and monitoring the effectiveness of the competency training as well as the behaviour of business and industry using communication strategy to help in getting the buy-in to promote the uptake of competency training. Besides, strategic communication also plays a role to promote star-rating as healthy brand competition which will further reinforce the values of IWRM. Short videos could be produced through competition to promote awareness about water best management practices amongst the business and industry and easily disseminate to targeted groups through social media. Besides that, resource persons could assist their companies to report water management performance through sustainability reporting on environment, social and governance (ESG) initiatives. Through guarded-self-regulation, DOE and the Department of Drainage and Irrigation (DID) could work together to provide a checklist that takes into account IWRM aspects to facilitate the business and industry to implement ESG beyond compliance.

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iv. Finance

The objective of the finance pillar is to strengthen financial capacity for water sector transformation. It is recommended for the Malaysian Investment Development Authority (MIDA) to introduce a new category in Green Incentives that are related to water management projects. This strategy aims to encourage more business and industry entities to adopt and implement water management projects in their premises and operations, for example, water reuse and reclamation for non-portable purposes. Any investments in this area to enable business and industry entities to adopt these practices should be given tax incentives.

Besides, the Ministry of Finance (MoF) and Inland Revenue Board of Malaysia (LHDN) should also give tax incentives to business and industry entities that managed to protect and upgrade the condition of their nearest water body whereby company's tax exemption will be given to business and industry entities for their involvement and contribution in conserving water resources. To assist SMEs in adopting water best management practices, the grant will be given as seed money to kick start the IWRM initiative. To recognise business and industry entities that succeed in applying water best management practices in their premises and operations, KASA is recommended to give the annual Water Sustainability Award as publicity for business and industry entities to improve their sustainability image.

v. Infrastructure & Technology

The objective of the infrastructure & technology pillar is to develop sustainable infrastructure with cost-effective technology. Under the infrastructure & technology pillar, it is aimed to set up one-stop training centres at the national and state levels in which DID will provide their existing training centres for the purpose.

7.5.4 The Training Module for Business & Industry

Training module is part of the AACB programme, delivering the capacity building materials for the Business & Industry sectors. Besides that, there are three other modules developed according to the aforementioned clusters. In this training module, it is divided into three levels, whereby:

i. The elementary level provides an overview of the landscape of business and industry sectors in Malaysia. The illustration will be given about water consumption and wastewater generation in business and industry sectors, water-related policies, legal implications and economic incentives to accelerate IWRM implementation in Malaysia. The elementary level is catered for supporting staff in companies to create awareness about sustainable water management.
ii. The intermediate level provides the concepts that need to be adopted by the participants for shifting the paradigm in water management whereby the participants are hoped to advocate for transformation in their management practices. The intermediate level is catered for executive staff in companies to promote advocacy for IWRM.
iii. The advanced level provides the six-step principles as the action framework and benchmark to be adopted and emulated by participants and benchmark when they return to their organisations. The advanced level is catered for EHS and sustainability-related professionals as well as top management to equip them with the capacity to accelerate the implementation of IWRM in their respective organisations and river basin.

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Table 7.25: AACB Recommendation Strategy Plan and Implementation Road Map for Business & Industry Cluster

	Strategy	Programmes/ Activities	Budget (RM)								Target Completion	Remarks	
			2021	2022	2023	2024	2015	Total 12MP	13MP	14MP	15MP			
People	Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders	AACB "Training of Trainers"	-	300K (1pax = 968.90)	300K	300K	300K	1.2M	1.2M	1.2M	1.2M	12MP and Beyond	Setting up One-stop Training Centres at national and state evels, providing AACB integrated training modules.	People
	Provide competency certification for business and industry stakeholders who have undergone the training	Water management certificate	-	150K (1pax = 3000)	150K	150K	150K	750K	1.5M	1.5M	1.5M	12MP and Beyond	Giving competency certification for EHS and Sustainability Professionals of business and industry.	
	Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc)	CPD for water management	-	120K (management fee)	120K	120K	120K	480K	480K	480K	480K	12MP and Beyond	Giving CPD point to all staff and officer that attend business and industry module training.	
Governance	Government to form strategic partnership with business and industry and establish resource person directory within their regional network	Water resource person network and directory	-	100K (event/ meeting)	100K	100K	100K	400K	500K	500K	500K	12MP and Beyond	Resource persons are appointed from those competent trainers upon attending business and industry module training for their respective zone and region. A directory of resource person is available for public access.	Governance
Information & RDCI	Resource person to publish and disseminate water best management practices in business and industry through public communication means	Water best management practices communication	-	100K (event/ meeting)	125K	125K	125K	500K	500K	500K	500K	12MP and Beyond	Interactive public communication for water best management practices.	Information & RDCI

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continued

	Strategy	Programmes/ Activities	Budget (RM)								Target Completion	Remarks	
			2021	2022	2023	2024	2015	Total 12MP	13MP	14MP	15MP			
Finance	Introduce new category in Green Incentives that is related to water management project	Water incentives	-	1.9M (1 pax = 150K)	1.9M	1.9M	1.9M	7.5M	7.5M	7.5M	7.5M	12MP and Beyond	Promoting more business and industry to adopt and implement water management project in their premises.	Finance
	Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody	Company tax exemption	-	1.25M (1 pax = 100K)	1.25M	1.25M	1.25M	5.0M	5.0M	5.0M	5.0M	12MP and Beyond	Giving tax exemption to business and industry for their contribution in conserving water body near their premises.	
	Give awards and recognitions to business and industry that succeed in applying best management practices in their premises	Water Sustainability Award	-	1.9M (1 pax = 150K)	1.9M	1.9M	1.9M	7.5M	7.5M	7.5M	7.5M	12MP and Beyond	Giving annual award and recognition as a publicity for business and industry to improve their sustainability image.	
Infrastructure & Technology	One-stop Training Centre at national and state	Water One-Stop Training Centre	-	100K (maintenance)	100K	100K	100K	400K	500K	500K	500K	12MP and Beyond	Using DID existing training centres for business and industry module training.	Infrastructure & Technology

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7.6 Community, River Basin and Water Related Disaster

Prof. Madya Dr. Rasyikah Md Khalid, Prof. Dato' Dr. ChM. Mazlin Mokhtar, FASc. and Nurul Iman Abu Hanifah

7.6.1 Background

"We are living in a community, whatever post we hold in our respective organisations. Whatever race and religion we embrace, we have been living in harmony since independence and enjoy abundance of natural resources throughout the country, especially clean fresh water. We used to fish and drink from the river and enjoy social activities by the river". However, rapid, and unsustainable development have changed the scenario. Community in the major township including the capital Kuala Lumpur have been facing occasional water supply disruption due to polluted river. The impact of the development can also be seen from frequent flash flood and even landslides throughout during heavy downpour.

Water managers and engineers have introduced several concepts to achieve water sustainability. The Global Water Partnership (GWP) and Malaysian Water Partnership (MyWP) have been focussing on the new concept of integrated water resources management (IWRM). This refers to a process which promotes a coordinated development and management of water, land, and related resources, to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of the entire ecosystems (Clausen, 2004). The main aim of IWRM is to transform the sectoral approach in planning and management of water resources to a more integrative and holistic approach among all stakeholders.

A subset of IWRM is the integrated river basin management (IRBM) which refers to the sustainable management of land and water based on natural geographical boundaries, rather than administrative units. Besides these, large countries including India has ventured into a new concept of integrated urban water management (IUWM) which aim to manage freshwater, wastewater, and storm water as components of a basin-wide plan in an urban setting (**Figure 7.33**).

While IRBM requires local participation in the river basin management both in rural and urban areas, the IUWM calls for good governance and local government empowerment in the growing and congested urban areas. Malaysia and other countries with coastlines have also been working towards integrated coastal management (ICM) while countries with large lakes like Japan have embarked on integrated lake catchment management (ILCM). Within a river basin (**Figure 7.33**), forest also plays an important role as a catchment area, hence integrated forest management (IFM) is needed to ensure a sustainable river flow. These approaches aim to achieve water sustainability and can be done through a holistic and integrated management with all the stakeholders including the community.

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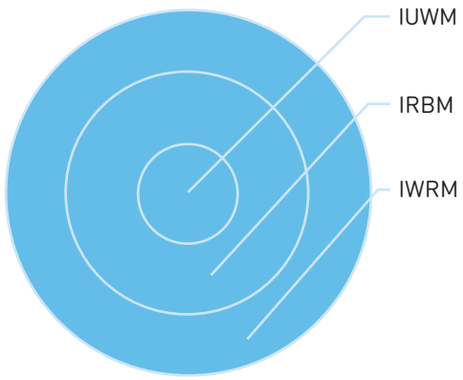


Figure 7.33: Water Management

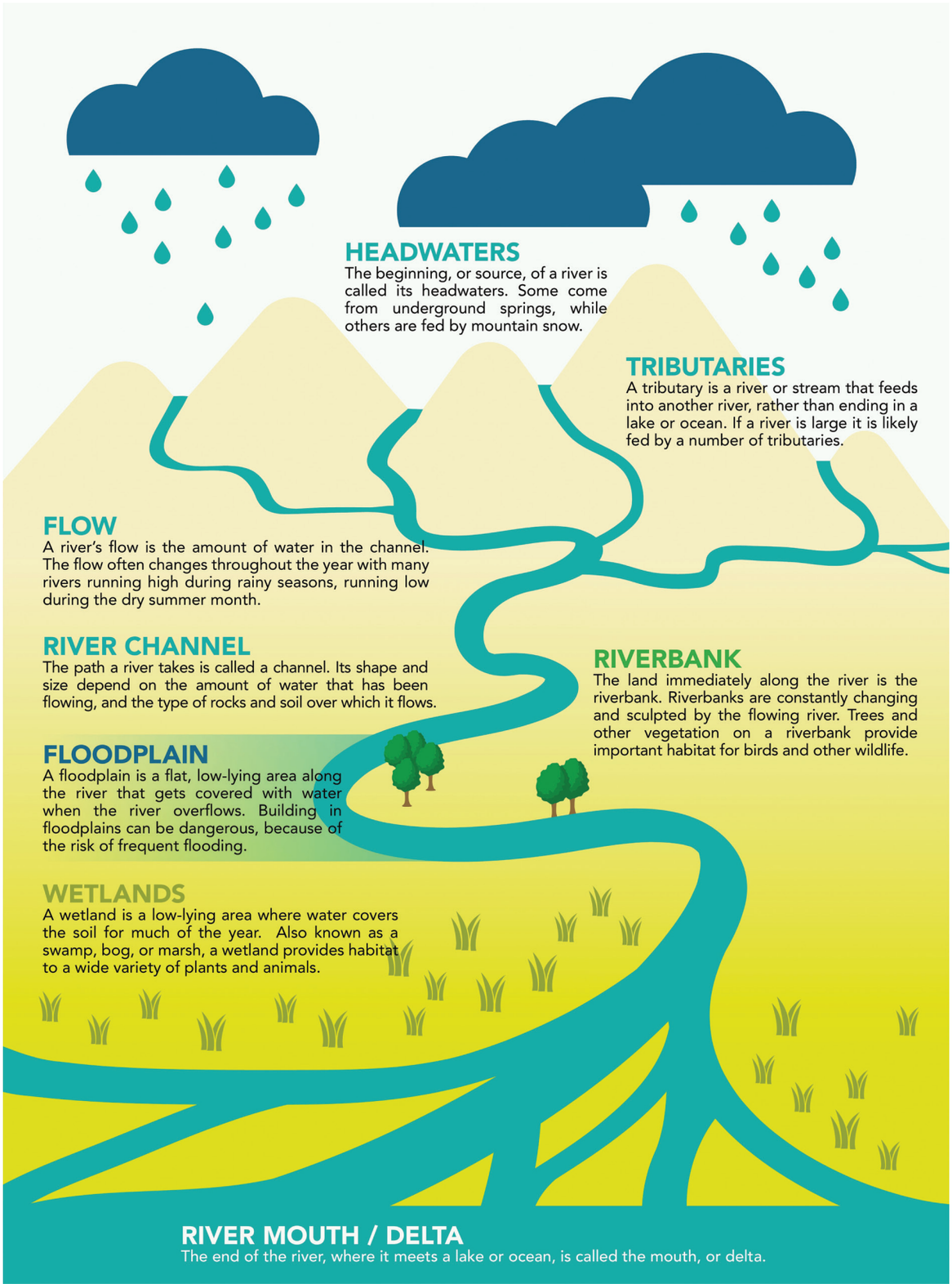
As a community, we are living in a river basin that catch rainwater in the headwater, which later form river tributaries, and ends up in a river channel. A river basin may consist of a district, several districts or even states (**Figure 7.34**). The Langat River basin for instance, consists of the Hulu Selangor district in the upstream, the Kuala Selangor district downstream, the whole of Putrajaya in the middle of the basin, a small part Negeri Sembilan in Labu and Nilai, and a tiny spot of the capital of Kuala Lumpur. On the other hand, the Muar River basin consists of several districts in the states of Johor, Melaka, Negeri Sembilan and Pahang. Up north, the Ulu Muda Forest forms the headwater for the Muda River basin and supply raw water to water users in Kedah as well as the neighbouring states of Perlis and Penang. Below in **Table 7.26** is the summary of the categories and the number of river basins in Malaysia.

Table 7.26: River Basin in Malaysia

Category	Number of river basin	Size (km^2)
River basin within a state	2.958	263, 498.756
River basin shared with several states	22	56,840.494
River basin shared with neighbouring country	6	7,557.762
TOTAL	2986	327,897.012

The flow of a river basin, if disturbed by unsustainable development, large scale urbanisation or deforestation, will lead to water related problems like flood, erosion, landslide, and pollution. To make things worse, climate change will exacerbate this problem, while El Nino causes more drought in the country. **Table 7.27** below are the 10 major flood incidents faced by the Malaysian community, thus far.

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Source: River Care Module (2019)

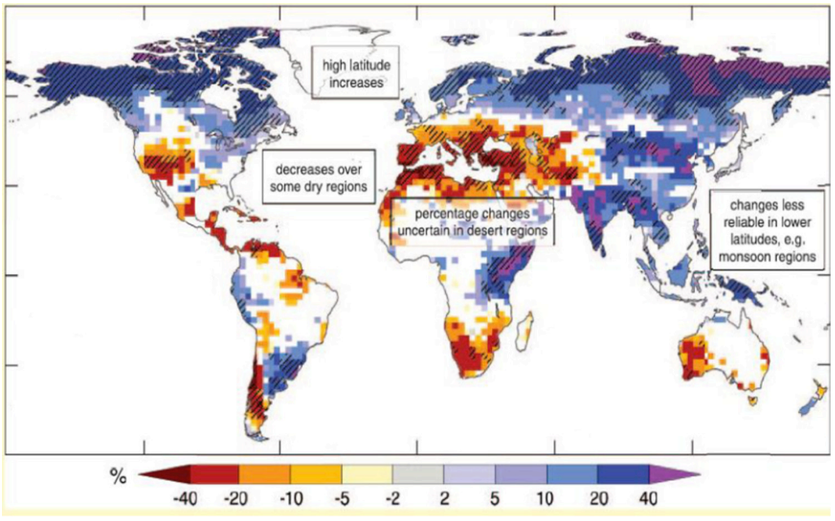
Figure 7.34: Journey of water

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Table 7.27: 10 Worst Flood in Malaysia

Incidents of major flood	Description
January 2007: Johor-Pahang region	Killed 17 people, affected 137,533 people, and caused the economic loss of about RM605 million.
December 2007: Kelantan, Pahang, and Johor	More than 4,000 people were sent to relief centres.
October 2010: Perlis, Terengganu, and Kelantan	The worst flood in 30 years.
January 2011: Segamat, Batu Pahat, Kluang and Muar	More than 24,000 were forced to seek refuge in 71 relief centres, with five casualties.
December 2014: East Coast and West Coast of Peninsular Malaysia	21 casualties, a quarter of a million people were evacuated.
December 2016: Kelantan and Terengganu	Approximately 25,000 people evacuated and blocked access to many villages.
January 2017: Johor, Kelantan, Pahang, Perak, Selangor, and Sabah	The floods have temporarily displaced about 12,000 families across the country.
November 2017: Penang	At least seven people dies. 80% of Penang was hit by typhoon-like winds and heavy rains. More than 3,500 were evacuated.
February 2018: Sarawak	Almost 5,000 people were evacuated.
November 2020: Pahang	Continuous downpour had caused landslides and cut-off access to areas affected by the floods.

Since Malaysia is located on the equatorial with generally high temperature and humidity level, the northeast monsoon will bring prolonged heavy rain between November and February and usually inundated extensive area in the east coast. Salmah (2010) projected a 10% increase of annual rainfall in the east coast of Peninsular Malaysia, but a 5% decrease in the west and south coast which are more developed and heavily dependent on high amount of raw water supply. This echo with the projection made by the Intergovernmental Panel on Climate Change (IPCC) as illustrated in **Figure 7.35** below.



Source: IPCC (2007)

Figure 7.35: Projected Changes in Runoff at the End of 21st Century

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Malaysia also faces occasional drought seasons that dried up water in the dams, especially in the highly populated and developed cities. The worst drought took place in early 2014 when most of the water level of the dams went below the critical level of 49 percent because of continuous dry spells. The Selangor River dam for instance reached 40.53 percent in March compared to 53.38 percent in February (LUAS, 2014). The pictures in **Figure 7.36** below illustrate the conditions of the dam before and after the drought. **Table 7.28** below are the 10 Worst Drought in Malaysia faced by the Malaysian community, thus far.



Source: BNBBC News (2014)

Figure 7.36: Selangor River Dam before and after Drought in 2014

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Table 7.28: 10 Worst Drought in Malaysia

Incidents of major drought	Description
1998: KL & Selangor	The severe drought in 1998, affected 1.8 million residents in southern Kuala Lumpur City, Bangi and Kajang, bringing in its wake some periods of disruption water supply.
2014: Malaysia	Approximately 2.2 million people in Malaysia were affected by the drought which lasted 2 months.
2016: Kelantan	More than 100 rubber tappers in Kampung Pulai, Gua Musang, Kelantan had their income affected when they had to stop tapping rubber due to the prolonged drought season.
2019: Kelantan	Kelah fish farmers in Gua Musang lost RM36,000.
2019: Kedah	Langkawi is the area most affected by the El Nino phenomenon after not receiving rainfall for the past 27 days.
2019: Kedah	A total of 5,894 snakes were caught by the Civil Defense Force (APM) from January to mid - February 2018 throughout the state of Kedah due to hot weather in a long drought season.
2019: Kelantan	Kota Belud Integrated Agricultural Development Area Director Salmah Labulla estimated 19,300 farmers were severely affected.
2020: Kedah	Pokok Sena paddy farmers incurred RM1 Million loses due to drought.
2020: Sabah	Drought affecting water supply in 18 Tuaran villages.
2021: Kedah	Drought leaves 3,000 taps dry in Kedah.

Climate change has brought not only more flood and drought in the country, but also increasing landslide incidents. The Work Ministry has identified 21,000 landslide prone areas nationwide and asked the public to look out for early warning signs during rainy monsoon season. Its slope engineering division has conducted an inventory of all landslides prone areas and has been allocated RM360 million to protect the slopes. The urbanites of the Klang Valley in particular faces more fear of landslide as there has been increasing development on or by the hill slope which fail to consider the slope history and the risks of landslides due to heavy rain. **Table 7.29** below are the 10 Worst Landslides in Malaysia faced by the Malaysian community, thus far.

Table 7.29: 10 Worst Landslides in Malaysia

Incidents of major landslides	Description
1993: Highland Tower, Ulu Klang, Selangor	48 deaths and 2 injuries. One building collapsed.
1995: Kuala Lumpur-Karak Highway	20 deaths, 22 injuries, and ten cars damaged.
1996: Pos Dipang, Kampar, Perak	44 people were killed.
1999: North-South Expressway, Kuang, Selangor	Thousands of vehicles stranded. Road closure lasting one day.
2008: Kuala Kubu Bharu, Batang Kali, Selangor	Two sisters were buried alive when a landslide hit a bungalow.
2011: Puncak Setiawangsa, Kuala Lumpur	88 residents of bungalows, shop houses, and double-storey terrace houses ordered to move out.
2016: Karak Highway	Blocked all lanes in both directions on the highway and four vehicles were trapped in the landslide.
2017: Tanjung Bungah, Penang Island	Killed 11 construction workers.
2020: Taman Kelab Ukay, Bukit Antarabangsa	40 residents were ordered to leave their homes.
2021: Kota Kinabalu	10 landslides were reported in seven villages, involving four districts, namely, Kota Kinabalu, Kota Marudu, Pitas, and Kudat. No casualties.

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Source: MyMetro (2014)

Figure 7.37: Landslides at Bukit Antarabangsa (2010), Setiawangsa (2012) and Mahameru Highway (2014)

Other critical issue on water resource in Malaysia is pollution. Pollution that occurs as a result of nature and human actions. Lately, human greed to explore nature has led to environmental pollution and destruction. Pollution from human and industrial waste products has caused a lot of pollution of water resources and in turn led to the closure of water treatment plants and adversely affected human health. Daily waste production amongst the people in the country recorded an increase of 100.75 percent to 38,142 tonnes in 2018, compared to 19,000 tonnes in 2005. Based on figures released by the Solid Waste Management and Public Cleansing Corporation (SWCorp), a citizen is estimated to produce 1.17 kilograms (kg) of waste per day in 2018, compared to 0.8kg (2005). On the same report, the percentage of plastic waste recorded increased 20 percent in 2018, compared to 44.5 percent of total waste was food waste, while plastic waste (13.2 percent) and disposable diapers (12.1 percent), in 2005. **Table 7.30** below are the Worst Water Resource Pollution in Malaysia faced by the Malaysian community, thus far.

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Table 7.30: Worst Water Resource Pollution in Malaysia

Incidents of pollution	Description
1990-2010: Sungai Pinang, Penang	Ongoing dumping of waste from a pig abattoir has resulted in bad odour, rendered the river black, and killed aquatic life.
April 2016: Sungai Mas, Penang	Illegal commercial units dumped sewages and rendered Sungai Mas black and smelly, irked holiday makers, hoteliers, and fishermen near Batu Ferringhi.
October 2016: Sungai Semenyih, Selangor	Sungai Semenyih water treatment plant had to be shut due to pollution from the Lalang River near Semenyih Hitech area.
October 2017: Sungai Johor, Johor	Illegal poultry farm released ammonia pollution in Sungai Johor that led shut down of three water treatment plants.
March 2019: Sungai Kim-Kim, Johor	Residents near the river, including students, suffered breathing difficulties, nausea and fainting due to the pollution. 111 schools in the area were ordered to be closed.
September 2020: Sungai Gong, Selangor	Air Selangor stopped the operations at its Sungai Selangor Water Treatment Plant (WTP) Phases 1, 2, and 3 and the Rantau Panjang WTP due to industrial effluent pollution. 1.2 million users affected.
October 2020 Sungai Selangor, Selangor	Solvent caused odour pollution in Sungai Selangor that resulted in water supply disruption to 1.2 million account holders.
October 2020 Sungai Semenyih, Selangor	Waste and organic compounds in Nilai polluted Sungai Semenyih upstream and affected operations at two water treatment plants and disrupted water supply to 300,000 users.
March 2021: Sungai Kim-Kim, Johor	After 2 years, Sungai Kim-Kim was polluted again, and fishermen complained that the fish have disappeared.
April 2021: Sungai Skudai, Johor	Pollution caused by industrial effluents and sewage has affected the Sultan Ismail Water Treatment Plant (LRA) and disrupted water supply to residents in Johor Bharu.



Source: The Star (2019)

Figure 7.38: Pollution at Sungai Kim-Kim released toxic gas caused nearby school children and resident fainted and sick

7.6.2 Stakeholder's Engagement for Community Cluster

Total of 5 stakeholders' engagement has been conducted in developing the WST2040 AACB Community cluster roadmap as details in **Table 7.31** below:

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Table 7.31: Stakeholder's Engagement for Community Cluster

Stakeholder's Engagement	Date	Platform	Main Findings
Site Visit: Kelab Alami 1. Shalan Jum'at Mohammad Haikal bin Zamani	26 Aug 2020	Physical	Kelab Alami as Public Participatory Platform to enable the community to earn alternative livelihoods, as well as participate in, and benefit from the environment and development around them.
Interview: Water Warrior (University Malaya) 1. Dr. Zeeda Fatimah Mohamad 2. Dr. Fathiaha 3. Dr. Aishah 4. Affan Nasaruddin 5. Siti Norasiah Abdul Kadir 6. Eddie Malek	15 Dec 2020	Online	1. Water Warriors is an environmental project in the campus for the protection and conservation of water bodies in UM. In the spirit of community aimed towards bringing back the sense of ownership, the programme is not only focussing on monitoring, but also involvement in 'gotong-royong' and public reporting on water leakages in campus. Water Warriors are also deeply passionate about documenting flora and fauna, especially freshwater habitat such as aquatic insects, waterfowl, and wetland plants. 2. The project started off as an outreach programme that builds public awareness and involvement in protecting water resources around the campus by engaging the community to conduct basic monitoring, a termed known as 'citizen science'. Community driven data from citizen science programmes such as waste river audit, water quality monitoring can also contribute to baseline and scientific study. Community can be trained to collect data and analyse the data to solve local environment issues.
Interview: Global Environment Centre (GEC) 1. Jagesdewari	21 Dec 2020	Online	1. GEC has 22 years of experience in river revitalisation through communication participation in Malaysia with various approach, modules, tools, kits, programmes and method to engage with community. 2. Friends of Klang River Basin is one of the Public Participatory Platform invented by GEC. FKRB is established to formalise the network and sharing platform where all the same minded people within ROLPOP5 and along the Klang Basin can share and promote the initiatives undertaken by the communities, association and individual to cultivate the sense of belonging on the river and the environment.
Interview: Green Waste Selangor GWS) 1. Dr. Maisarah Hawa Zainal	20 Jan 2021	Online	GWS create a platform for the community to preserve environment and generate income at the same time by teaching them to make soap from used oil.
Webinar: Community-Led River Basin Management in Kedah 1. YB Dato' Suraya Yaacob, Member of the Kedah State Executive Council (EXCO)	11 Feb 2021	Online	1. YB Dato' Suraya presented the background of water resources in Kedah, Integrated River Basin Management in Kedah, the role of Lembaga Sumber Air Negeri Kedah (LSANK) and many more. 2. Emphasised the role of community in facilitating the state government in obtaining a better water resources management in Kedah. 3. Many representatives coming from various ministries, agencies, private sector, academic institutions, Non-Governmental Organisations (NGOs), other Water Sector Transformation 2040 (WST2040) sub-sectors and public showed interest and participated in the survey and "Question and Answers" of the webinar session.

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continued

Stakeholder's Engagement	Date	Platform	Main Findings
AACB Community Module Validation Session Global Environment Centre (GEC) 11. Dr. Kalithasan 12. Sathis Venkitasamy 13. Jagesdewari Water Warrior 14. Dr. Zeeda Fatimah Mohamad 15. Affan Nasaruddin WWF Malaysia 16. Daria Mathew 17. Ching Hui Wong 18. Dhiya Shafiqah Ridzuan Jabatan Pengairan dan Saliran (JPS) 19. Asmadi Ahmad 20. Mohammad Hakim Hasnul	3 August 2021	Online	1. Recommendation to develop a water NGOs directory where all of details and information of the NGOs integrated as reference for the community. 2. Suggestion to do a coordinating unit at federal level to coordinate all the existing NGOs like MENGO but specifically for water. 3. Awarding system in community is essential to motivate them to participate in environmental preservation activities.

7.6.3 Role of Indigenous People in AACB

The involvement of Orang Asli is significant in river basin management. They can be the forest's eyes and ears as the primary catchment and ensure sustainable river basin management. Currently, there are deep inequalities toward Indigenous People. Orang Asli needs to share sacred rivers and traditional food sources and continue to this day to significantly feel the impacts of dams, pollution, and inequitable water management decisions. Climate change, which is bringing increasingly severe floods and droughts, is exacerbating these current problems. For too long, indigenous people have been kept out of decision-making and disregarded by the mainstream environmental movement. In AACB, there is no separation of the indigenous community in the community cluster. If there are indigenous people in the targeted river basin, they will be trained as Community Leaders. For the PPPs, they will use the platform listed for the community. As a matter of fact, they have a closer relationship with rivers and forests, and their traditional ecological knowledge is very essential and useful.

In 2015, the indigenous people of Malaysia or Orang Asli represented about 13.8% of the population of Malaysia. There are 18 Orang Asli subgroups, with the Negrito (Semang), Senoi, and Aborigen-Malay groups representing around 210,000 people or 0.7% of their population in Peninsular Malaysia. (IWGIA 2020). In Sarawak, indigenous peoples are natives of Dayak or Orang Ulu. They include the Iban, the Bidayuh, the Kenyah, the Kayan, the Kedayan, the Lunbawang, the Punan, the Bisayah, the Kelabit, the Berawan, the Kejaman, the Ukit, the Sekapan, the Melanau and the Penan, and account for 1,932,600 people, or 70.5% of the population of Sarawak. Meanwhile, in Sabah, the 39 different indigenous ethnic groups are known as natives or Anak Negeri and constitute about 2,233,100 people or 58.6% of the population of Sabah. The main groups are the Dusun, Murut, Paitan and Bajau groups (IWGIA 2020). Although the Malays are indigenous to Malaysia, they are not categorised as indigenous because they constitute the majority and are political, economically, and socially dominant.

7.6.4 The Roadmap of Community Cluster

Taking stock of water related problems faced by the community, there are two overarching strategies which had been proposed under the community cluster.

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Strategy 1: Increasing community awareness and instill ownership towards rivers and other water resources in their river basins.

There are many NGOs which have conducted activities with the community such as Friends of Langat River, Trash Hero Langkawi, Friends of Rivers Malaysia; ROLPOP AU2 Community, GEC, WWF-Malaysia, etc. They aim at acts that are transforming the community to care for their rivers. Their modules are tailored to specific audiences within the communities and their efforts are extremely commendable. However, most of these efforts are difficult to sustain due to the lack of funding and due to weaknesses in the enabling environment, including failure to attract the community to sustain their recommended activities.

The community leaders and religious leaders can indeed influence the community, but they are not equipped with the necessary knowledge, or they are simply not interested at all. They do not feel that it is their role to care for the river as the 'government' will take care of the problems.

Table 7.32: Strategy 1 Increasing community awareness and instil ownership towards rivers and other water sources in their river basin.

Strategy 1: Increasing community awareness and instil ownership towards rivers and other water sources in their river basin.

Focus Area	Programmes	Lead Authority	Targets	Budget	Remarks
People (8is - Interaction, Intellectual Capital)	To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	KASA & state BKSA	12MP: 1,500 pax 13MP: 3000 pax 14MP: 6000 pax 15MP: 12000 pax	12MP: RM7,670,000 13MP: RM15,300,000 14MP: RM30,600,000 15MP: RM61,200,000	
Infrastructure and Technology (8is - Infrastructure)	To develop an Apps Myriverbasin To establish a one-stop website through an Apps to share/ link data needed or the community to decide on river basin To adopt an advanced technology in spreading awareness to community information.	KASA & state BKSA	Developed during 12 MP.	RM1,000,000	
Information and RDCI (8is - Infostructure)	To establish an information corner at the religious and community centre.	KASA & state BKSA	12MP: 400 centres 13MP: 1,000 centres 14MP: 1,500 centres 15MP: 2,000 centres	12MP: RM40,000 13MP: RM100,000 14MP: RM150,000 15MP: RM200,000 (RM100 per centres)	
	Notice board by the river		12MP: 400 rivers 13MP: 1,000 rivers 14MP: 1,500 rivers 15MP: 2,000 rivers	12MP: RM200,000 13MP: RM500,000 14MP: RM750,000 15MP: RM1,000,000 (RM500 per river)	

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Align with 12th MP Strategy B1, WST2040 AACB community module highlighted the Community-driven programmes in environmental conservation will be increased to empower people to protect and conserve water resources as well as create socioeconomic activities. Various successful initiatives including the Tagal system and FoR programmes were also included in the module to expand the implementation. Campaigns to inculcate water-saving habits and precise water use amongst domestic users were also emphasised.

Through the WST2040 AACB community module, it is hoped that the enabling environment can be created to accelerate community participation and water stewardship expansion in the country. Strategic partnerships between the NGOs and the community will be organised to tackle issues faced by them effectively, to increase the community's awareness and to instil a sense of ownership towards their rivers.

Strategy 2: Empower community to effectively participate in IRBM to adapt to climate change and reduce the risk of disaster.

When the community have a sense of ownership towards their rivers, then this will make communities realise that their activities in the upper or lower basin will affect the other subgroups of the community in the river basin. They will be more interested to know what are happening in their river basin in terms of development.

Realising that they have a responsibility to discharge, they will then be more responsible to participate in the development process. They hopefully, will be more willing to go through the state structure plan or their local authority's local plan. They will be more sensitive and give particular attention to activities and development plans that will have impact on the river basin and that could cause water related problems.

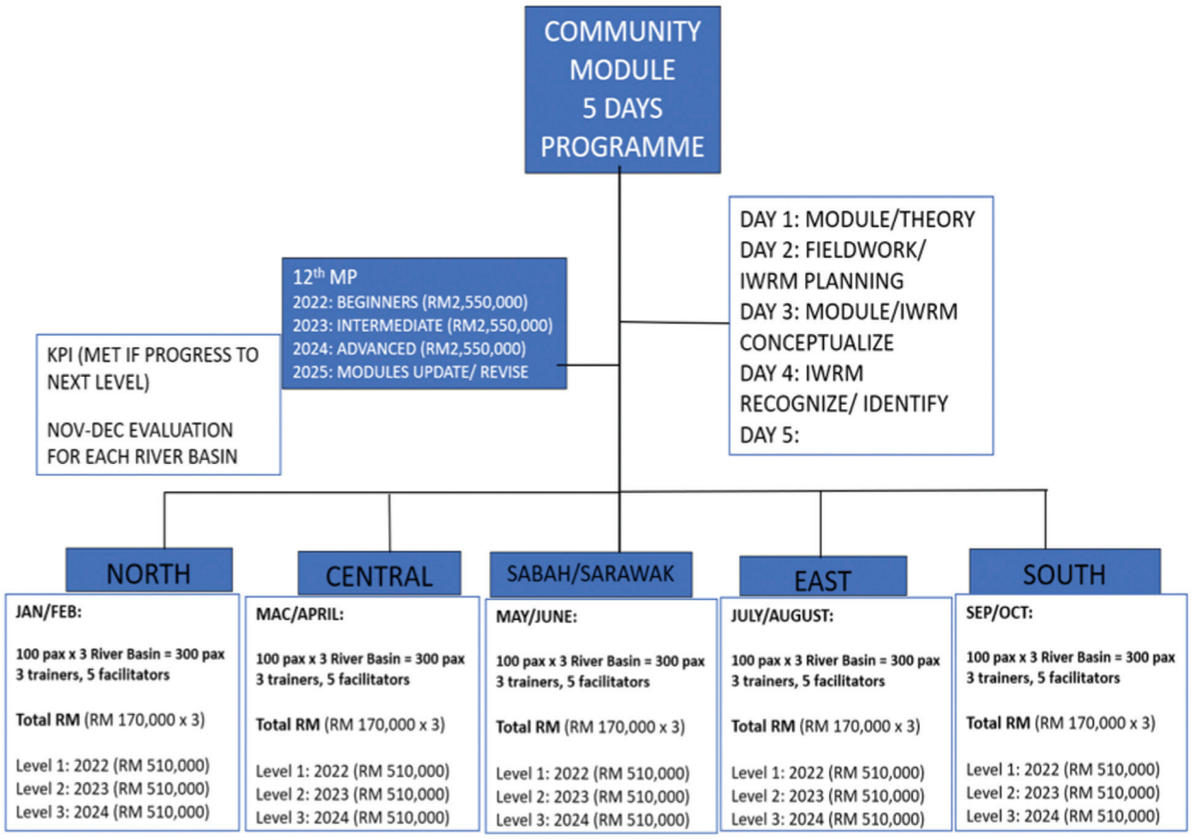
Table 7.33: Strategy 2 Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction.

Strategy 2: Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction.

Focus Area	Programmes	Lead Authority	Targets	Budget	Remarks
Governance (8is - Integrity, Institution)	To establish a formal platform/ state IWRM Training Centre. To reduce red-tapes when dealing with complains from community.	KASA & state BKSA	Training facility, and trainer fee	Consolidated at the Focus Area of People	Establish an IWRM Training Centre in each state (to be consolidated with other modules)
Finance (8is - Incentives)	To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	KASA & state BKSA	The federal government should set certain targets and provide sufficient funding for the state and local government	Will be consolidated with the local plans/ IRBM plans	To ensure the local plans consider the needs of the community in the river basin (climate change impact and water problems)

The AACB modules will guide the community to understand about their river basin, the development processes, and identify the risks before disasters may occur. With sufficient knowledge, they will be able to prepare themselves better including towards climate change impacts, and to reduce the risks of disasters.

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7.6.5 Pilot Study

Muda River Basin is located at The Muda River Basin in the northern State of Kedah, Malaysia, is one of the most in demand river basins in terms of water utilisation in the country with a width area (km²) of 4,219. Muda river basin is under the jurisdiction of four local authorities such as Majlis Daerah Baling, Majlis Daerah Sik dan Kulim, Majlis Daerah Kuala Muda with a population of 500,900. The length of the river is 178 (km) and the main economic activities are Agriculture (Paddy) with Muda Agriculture Development Authority (MADA). One industrial Park which is Sungai Pasir Industrial Park is located near to the river basin. There are few active Public Participatory platforms involving NGOs in the river basin which were Friends of Ulu Muda II (FoUMII), Earth Lodge Ulu Muda Field Research Centre (UMFRC), KADA and WWF-Malaysia. Current research has been taking place in Muda River Basin, which is National Water Balance Management System (NAWABS) initiative being undertaken by Malaysia's Department of Irrigation and Drainage, a comprehensive water resources assessment of the Muda River basin has been conducted.

Key issues in Muda River Basin includes (Kalken & International, 2019):

- Multiple stakeholders with varying priorities,
- Water resources in the basin are now deemed to be limited,
- Different authorities manage key hydraulic infrastructure in the basin, and their operation needs to be coordinated,
- Future changes in land use and climate will affect the supply and demand for water, and
- The groundwater resource potential is yet to be fully explored.

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Justification for the pilot study:

- The basin has multiple stakeholders with varying priorities.
- The basin is located within two states in Malaysia
- The recent discovery of rare earth elements and the possibilities of REE industry will be developed in the area.
- Data availability due to the integrated river basin management study has been completed and currently, National Water Balance Management System (NAWABS) is ongoing.

On 30 September 2021, AACB conducted a pilot study session to test out the AACB Community Module. The pilot study participants are the targeted advocators, which are the community leaders (*Penghulu* and *Imam*) of Mukim Kulim, the community of the Muda River Basin. YB Dato' Suraya Yaacob, the Kedah State Executive Council member, the Chairman of the Water Supply & Water Resources Committee of Kedah, inaugurated the pilot study supported by YB Dato' Norsabrina Mohd. Noor, the Member of a Legislative Assembly Bandar Baharu.

Only Chapter 1, designed for beginners, was tested for this pilot study to get some views and feedback from the real actor on the ground. The session started with videos opening of IWRM community awareness programmes and continued with the presentation of the AACB Community Module by Assoc. Prof. Dr. Rasyikah Md. Khalid. Next, the session continued with interactive activities such as discussing the water issues in Malaysia and the history of their river. The participants were very participative in the activities and shared their concerns on the water issues at their place and their river history.

Two surveys were conducted at the beginning and the end of the session. The result indicated improvement of understanding of the role of the community towards their water resources. They are also willing to join more water awareness programmes. One of the participants said that he realised that the water management issues were not sufficiently highlighted in the community after joining the session.

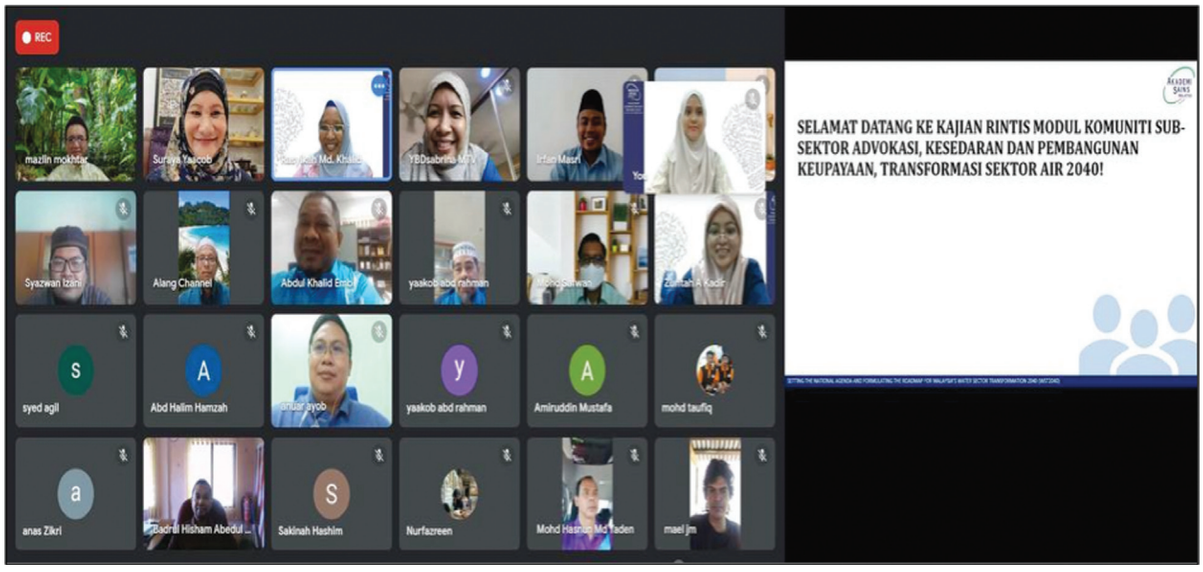


Figure 7.39: Online pilot study for community module conducted on 30 September 2021

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Participants List

1. Badrul Hisham Bin Abedul Talik
2. Abdul Mutalib Bin Che Sa
3. Sakinah Binti Hashim
4. Mohd. Nizam bin Fadzil
5. Muhammad Amiruddin Bin Mustafa
6. Abdul Wahid bin Osman
7. Anuar bin Ayob
8. Mohamad Hasnunrisam Bin Md Yaden
9. Mohd Afzal Bin Ghazali
10. Mohd Taufiq Bin Abu Hasan
11. Mohd Anas Bin Mohd Zikri
12. Mohd Bukhairi Bin Idris
13. Mohd Safwan Bin Haji Mat Soleh
14. Nuqman bin Amran
15. Hafiy Hazmi Bin Harun
16. Syed Agil
17. Muhammad Syazwan Wazini Bin Izani
18. Abdul Khalid Bin Embi
19. Abdul Halim Hamzah
20. Muhamad Ikhwan Bin Ismail

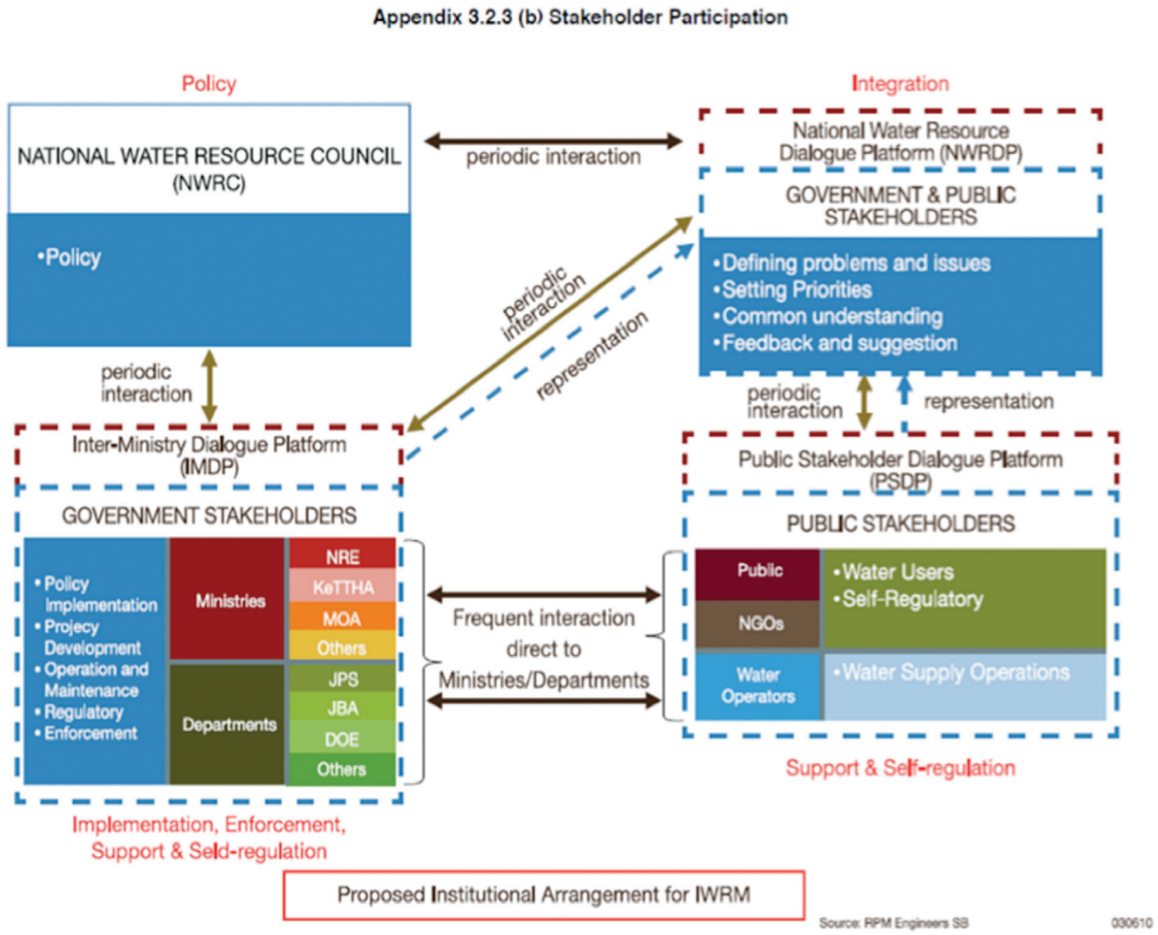
7.7 Identification of Public Participatory Platform

7.7.1 Background

Public participation is known as the process adopted by government or specific organisations to interact with the public in environmental assessment, planning, decision-making, management, monitoring and evaluation (EUKN; Dietz & Stern, 2008). It has gained global attention since the last half-century and became widely recognised due to its effectiveness in improving the quality, legitimacy and also the capacity of environmental assessment and decisions (Dietz & Stern, 2008; Fung, 2003). However, it can sometimes lead to unwanted outcomes due to the processes used to conduct public participation activities as well as to which extent the processes address the challenges. In general, there are five ways on how public participation takes place, namely inform, consult, involve, collaborate, and empower. In the study reviewed by Dietz and Stern (2008), it showed that the chances of getting a good result are higher if the public participation engagement is conducted with a clear objective and purpose, commitment, adequate resources, appropriate timing, and implementation focusses and commit to learning from experience by the parties. The authors recommended four principles to be considered during the design of participation process to improve outcome, which includes the inclusiveness of participation, collaborative problem formulation and process design, transparency in the process and a good-faith communication.

Public participation in water management is rather weak in Malaysia. It was reported by Akademi Sains Malaysia (2016) that the status of public participation in water management is mainly in the form of water forum for water supply and sewerage sector, and water user groups for the paddy irrigation sector. However, the interaction between relevant water managers and the end-users are still lacking and do not reflect the connection to the water management system as a whole (Ahmad et al., 2020). Akademi Sains Malaysia (2016) proposed a public participatory platform as shown in **Figure 7.40** below:

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Source: NIWRMP, 2016

Figure 7.40: Public Participatory Platform Framework

In the previous studies conducted to identify the characteristics of water management in other countries, particularly the developed and high-income nations, it was found that overall, there is a higher level of public participation in water management (Akademi Sains Malaysia, 2016). For example, public participation existed in the form of Water User Associations (WUAs) established by communities in France and the Germany. These communities have various interests in the aspects of water management, including water supply, river care, water bodies and irrigations and are often referred in all matters about water management. In Australia, major reform exercises, public forums are conducted at both local as well as on-line. These platforms serve the major channel for discussions, information dissemination and prepare the public for the changes in water management approach.

7.7.2 Data Collection

Listing of Public Participatory Platform (PPPs) was collected mainly through desktop studies, covering the existing PPPs, their functions and analysis. One of the characteristics for a successful public participation is the actor analysis. Analysing the operating, interested and/or the affected actors is one of the most essential preconditions for conducting an efficient and successful public participation (Haas, 2008). There is a total of 92 existing PPPs found whereby the PPPs are categorised into government, industry/business, academia and NGOs/CBOs/CSOs as listed in **Table 7.34**. From a total of 92 PPPs identified, only 85 PPPs focus on water.

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There are numbers of different functions of community level platforms in the country. There are mainly consisting of the following categories:

a. Non-Government Organisations Platforms

The non-governmental organisation (NGO) is a non-profit, citizen-based group that functions independently of government. NGOs are sometimes called civil societies, are organised on community, national and international levels to serve specific social or political purposes and are cooperative rather than commercial in nature (Folger, 2020). The main NGOs found in this study are the Global Environment Centre (GEC), Green Earth Society, *Pertubuhan Sahabat Alam Sekitar* Malaysia, Trash Hero World, and Malaysian Nature Society.

b. Water-related activities

Water-related platforms work on the conservation, development, and sustainable management of water resources for agriculture and food production, including responses to environmental challenges and climate change affecting food and agriculture (FAO, 2020). Main water-related activities that have platforms found in this study are Water Conservation Programme in Schools in Melaka, Water Watch Penang, *Persatuan Pendidikan Dan Kebajikan Jaringan Nelayan Pantai Malaysia*, and Penang River and Water Educational Programme (PRWEP), USM.

c. Movement for the specific area

Some platforms are designated at that specific area, such as Kelab Alami Mukim Tg. Kupang; Friends of Rivers, which has many platforms and at the assigned rivers, for example, Friends of Sungai Batum, Friends of Langat River and Friends of Kelana Jaya Park. Some of GEC's example is Community of Kinta River Basin, Island Ranger Pulau Pangkor, Perak. One of the examples which are specific to the community is the Community of the N Park Condominium Water Saving Project (under WWP). Some of the platforms are running their activities for certain areas or water body. For example, the Love Putrajaya Lake and Wetland and also The Setiu Wetland movement.

Friends of the river are a good example for public participatory platforms where extension of activities can be carried out and establish a more systematic communication and funding exercise. Capacity building programmes will be embedded to the existing platforms wherever the movement still in a working condition.

d. Conservation NGOs

An environmental organisation is an organisation mobilising conservation or environmental movements that seek to protect, analyse or monitor the environment against misuse or degradation from human forces (Frickel 2011). The examples of conservation NGOs found in this study are Water Voice (WWF-Malaysia), Wetlands International Malaysia, River terrapin ranger Kemaman (Turtle Conservation Society), and Wild Asia.

e. Government Agencies Platforms

A government agency platform involves members of the community `hands-on' and to be eyes and ears to assist government agencies responsible for combating activities that damage or pollute the environment. The platforms are operated by government agencies for the benefit of awareness programmes for the public, for example, the 'Off River Storage' (ORS) Downstream Reservoir in Kampung Hang Tuah, Kuala Selangor district, managed by Lembaga Air Selangor (LUAS). Another platform is the Rakan Alam Sekitar run by the Department of Environment under the Ministry of Environment and Water.

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Table 7.34: List of Public Participatory Platforms in Malaysia

No	Platforms	Functions
		COMMUNITY
1	Kelab Alami, Mukim Tg. Kupang (Forest City)	• Community development empowerment, environmental conservation, research on mangrove habitats • Major players: local communities, students • Trained youth to be a nature guide • Have engagement with relevant government agencies, and few properties development companies
2	Green Earth Society	• Mobilises movement to promote education and creating awareness on the deteriorating quality of the environment and the needs for conservation of nature • Main players: students, local community • Have engagement with relevant government agencies and CSR project with certain companies • Relevant activities include mudball activities, workshop, the release of fisheries into rivers to help fishermen
3	Kelab Alam Sekitar Seri Sempadan Muar Johor KASS	• Conservation of peat swamp forest • Engaged with Forestry Department
4	Kedah Water Hero	• An FB page set up because of Water Hero Challenge Negeri Kedah initiated by the state government to promote wise water consumption/water-saving campaign
5	Kelab pencinta Alam Darul Naim	• NGO that specialises in volunteer, social and environmental sustainability
6	Regional Environmental Awareness Cameron Highland (REACH)	• To preserve, restore and maintain Cameron Highlands as an environmentally sustainable agriculture and hill resort within a permanent nature reserve • Highlighting environmental problems, creating public awareness on environmental issues, and conducting water and forest biodiversity studies • Community Stream Investigation (CSI) Programme with schools
7	Consumers' Association of Penang (CAP)	• Ensures the right of every consumer to food, housing, health care, sanitation facilities, public transport, education, and a clean environment • Carries out various research, educational and representational activities to influence policy makers in giving priority to basic needs • Urges government to implement water-saving schemes
8	The community of The N Park Condominium Water Saving Project (under WWP)	• A pilot water-saving initiative such as installation of rainwater harvesting system, water savings fittings in toilets, installation of water-saving equipment • Water awareness and saving campaign • Funded by EPU, managed by DID, carried out by WWP, N-Park Management Cooperation and residents of N-Park
9	The community of Kinta River Basin (under GEC)	• To develop and adopt a strategy for forest and water resource management of the upper Kinta basin • To establish a community's engagement to address issues regarding forest management and river protection • Partnership with relevant key government agencies, Orang Asli and local communities
10	Island Ranger Pulau Pangkor, Perak (under GEC)	NA
11	Persatuan Aktivis Sahabat Alam (KUASA), Perak*	• To produce activists, networks and new generations who can make changes in creating a more harmonious system of life between humanity and environmental sustainability • Creating ideas and awareness of the environment amongst Malaysians towards building a progressive and sustainable society through the educational process

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No	Platforms	Functions
12	Sahabat Hutan Bakau (Friends of Mangrove), Perak (under GEC)	• Establish nursery seedlings • Sharing information and experiences with the public and training activities related to mangrove tree planting techniques and restoration of mangrove swamp ecology
13	Pesta Air Kuala Perlis 2019	• Activity: Lumba Perahu Tradisional, other water sports events such as slippery pole climbing, pillow hitting, fishing nets and fishing • Objective: Become one of the unique and superior water sports tourism destinations so that it becomes a focus for all water sports fans at home and abroad
14	Freshwater for Future (FFF), Forever Sabah	• To improve the resilience and management of freshwater species, habitat and watershed ecosystem services for Sabah • Government-Community partnerships for the gazettement and management of Water Conservation Areas as a means of protecting biodiversity and improving forest connectivity • Education and awareness workshops and publication of knowledge about aquatic species, water quality, hydrology, monsoonal meteorology and traditional fishery ecological knowledge
15	MESCOT Initiative, KOPEL, Sabah	• Protecting the forest habitat, wildlife and biodiversity of the Lower Kinabatangan while preserving the livelihood of the local population.
16	Sabah Wetlands Conservation Society	• Spreads environmental awareness by continuously educating the locals about the importance of wetlands conservation
17	Pertubuhan Sahabat Alam Sekitar Malaysia (SAS)	• Provides awareness to the Malaysian community on the importance of environmental protection and the campaigns carried out by SAS Malaysia include the Malaysian community, primary & secondary school students as well as IPTA / conducted campaign such as beach clean-up, 1 Student 1 Tree, etc
18	The Malaysian Water Association (Branch)	• Promotes training in the management of the water supply • Provides advice and information on water supply and wastewater to the public • Publicizes new technologies and promotes the use of appropriate technology in the water supply and wastewater industries • Enhances the knowledge and skills of its member and promote awareness of water issues amongst the public
19	Friends of Sungai Batu	• Rivers clean up and beautification activities amongst local community
20	Inspirasi Kawa	• A youth environmental group specialises in firefly, river and mangrove habitats • "Kawa" means RIVER in Japanese. Supported by University Malaya & Hartalega • Conservation of firefly, river and mangrove habitat • Advocate for watershed conservation • Major players: local community, students, youth, corporate sector staffs
21	Friends of Langat River Selangor)	• An initiative by the local community to conduct river clean up and beautification at Langat River
22	Kelab Warisan Sungai Klang	• Clean the Klang River • Mainly residents near the area • Integration of Klang citizen, history, culture and art to promote Kota Bridge • Aims to be the riverside role model
23	Off River Storage (ORS) Communities, Selangor	• Beautification and lake clean up activity, trees planting, kayaking • Aims to shape/develop ORS Kg. Hang Tuah to become an education centre, water sport and recreation, and source of water in Selangor
24	Wetlands International Malaysia	• Maintaining and restoring wetlands • Advises local organisations on how to use their wetlands sustainably and enable them to take action themselves • Carries out research to elucidate and quantify the role of wetlands in water management
25	Persatuan Alam Sekitar Selangor	NA

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No	Platforms	Functions
26	Friends of Kelana Jaya Park	• Community initiative to make Kelana Jaya Park a clean, healthy, safe and sustainable place belonging to the community • Tree planting and gotong royong activity • To improve the water quality of Kelana Jaya lakes and its associated biodiversity through active participation of local communities using innovative technologies • To demonstrate an innovative and affordable solution to improve water quality in the polluted lakes • To strengthen the role of the residents, especially Friends of Kelana Jaya Park and other partners in the stewardship of the lakes and the park • To promote environmental awareness and education, especially on the rehabilitation of the park
27	Sahabat Komuniti Sungai Way	• River clean-up activity with local communities • Programme community together River of Life (ROL). themed "Back to Nature" di Taman Melawati
28	SPARK Foundation (partnership with GEC)	• Engaging key stakeholders to work hand-in-hand to address the problems that threaten and pollute our rivers. • Introduce education outreach campaigns that mobilise and reconnect these communities with the rivers that flow through their neighbourhoods • Engaged with local communities, government agencies, NGOs
29	Pertubuhan Gagasan Prihatin Semenyih (GPS)	• To increase awareness amongst local community about the importance of conserving rivers for future generations • Knowledge and skills in water quality monitoring and identifying water pollution sources and illegal activities • Mainly involves the local community and students
30	International Water, Air & Soil Conservation Society	• NGO that aims to spread awareness on environmental conservation at all levels of community to utilise natural resources wisely • Mainly made up of researchers and academician
31	Friends of Sungai Klang Mid Valley	• To enable the River Three River Conservation, Protection and Rejuvenation programmes at the riverbank near Mid Valley Megamall • Mainly residents around the area • Weekly Cleanup • Created a community garden
32	Tatana Roots	• To create awareness on the importance of the preservation and conservation of our natural heritage through environmental education • Specially tailored environmental education programmes for all to experience, especially children
33	Friends of Taman Aman	NA
34	Persatuan Wanita Kg. Mangkok (PEWANIS), Setiu (mangrove rehab) - Nestle programme collaborate with WWF Malaysia	• Highlighting the environmental awareness from local villagers and community empowerment - Mainly local women • Wetland's conservation
35	Persatuan Perkembangan Wanita Kg. Beris Tok Ku Nestle programme collaborates with WWF Malaysia	• Highlighting the environmental awareness from local villagers and community empowerment - Mainly local women • Wetland's conservation

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No	Platforms	Functions
36	Sahabat Setiu - Nestle programme collaborates with WWF Malaysia	• To conserve and preserve the wetland at Setiu
37	Setiu Wetlands Discovery (ECOSWED INITIATIVE) - Nestle programme collaborate with WWF Malaysia	• Emphasises the concept of nature • Provides environmental knowledge through theory and hands-on. • Works to develop and strengthen sustainable community-based ecotourism activities, via compact sets of training, technical support, capacity building, educational talk, wetland environmental awareness & education programme • Mainly students and residents
38	Love Putrajaya Lake and Wetlands	• Putrajaya Lake & Wetland - UNESCO-IHP Ecohydrology Demonstration Sites in the world
39	Friends of Sg. Penchala (under GEC)	• To protect and enhance Sg Penchala, river ports through local community participation • To encourage and support the local community, schools and initiatives to localise other stakeholders. • Running a mobile education programme to a larger target group through the Mobile River Care Unit (MRCU • Conducted River Walk, the hidden games of Bukit Kiara
40	Kina Benuwa Wetland and Mangrove Forest Reserve	• Conservation areas are dedicated to the protection of the ecosystem and to celebrate its rich biodiversity. While it is a hotspot for research and education, it is also a major eco-tourism destination in Labuan
41	Yayasan Hasanah	• Grant provider that aims to make a change in people and the environment • Focusses on the country's pressing community and social issues, bringing together policymakers, civil society organisations, corporations, and local communities to enable collective impact for the people and the environment
42	Nenggiri River Rehabilitation Programme (NRCP) (under GEC)	• Enhances the protection of natural resources and the environment in the Nenggiri River Basin • Develops sustainable use options for natural resources for local communities • Assists in the establishment of a conservation area in the Nenggiri River Basin • Focusses on the conservation of biodiversity, especially fish and ecotourism • Engaged with the state government and local community • Set-up of an information or training centre cum secretariat office in Gua Musang
43	Global Environment Centre	• Promotes and supports the integrated management of river basins with particular emphasis on ensuring that biodiversity and wetland conservation and community considerations are incorporated into river basin management
44	Environmental Management and Research Association of Malaysia (ENSEARCH)	• Mainly provides training and workshop to promote better environmental management
45	Sahabat Alam Malaysia (SAM)	• To ensure that the national fisheries industry expands with the sustainability of the marine resource
46	Trash Hero Kuala Lumpur	• The mission is to bring communities together to clean and reduce waste • Action and awareness; picking up trash • Education; actively engage children through the multilingual kids' programme • Sustainable projects; long-term programmes which help communities to reduce and better manage existing waste and develop strategies that prevent future waste • Inspiration; motivate people to become Trash Heroes in their everyday life
47	CSO Platform for Reform	• A coalition of 70 CSOs focussing on reforms for Malaysia Baharu
48	Komuniti 1 Malaysia	• The community that is established in every state to promote harmonious living amongst the community and unify citizens of different races

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No	Platforms	Functions
49	Friends of Ulu Muda II (FoUMII)	• Comes up with a website: www.saveulumuda.com • To raise awareness amongst the public on the importance of conservation • Raise awareness of the diversity and importance of the Greater Ulu Muda Forest • Engages state and federal governments and relevant stakeholders in exploring strategies for its conservation and effective management
50	Eco-Schools Melaka	• Run by Green Growth Asia Foundation • A state-wide programme that aims to empower children to drive change and improve their environmental awareness and improve their skills
51	Majlis Gabungan Badan-Badan gabungan Bukan Kerajaan – NGO's Parlimen MARAN	• Initiated to integrate all NGOs in Maran (Made up of at least 15 NGOs) to ease all activities/ programmes that will be conducted in Maran
52	Wild Asia (International)	• To inspire businesses to improve their social and environmental practices to meet and exceed global standards • To promote change within the industry by engaging with businesses, particularly those with direct social and environmental impacts • Engaged key sectors, especially palm oil or tourism industry
53	Water Voice (WWF - Malaysia), Sabah	• Aims to promote and support improved management of freshwater habitats within key river basins in Sabah's terrestrial landscape, as well as to create awareness among civil society • The participatory photography programme is a good method to capture and document the communities' dependency on Sugut River and its tributaries that flow through their villages
54	Persatuan Pendidikan Dan Kebajikan Jaringan Nelayan Pantai Malaysia	• Involvement in activities to develop and enhance welfare, knowledge empowerment and efforts amongst the community, especially coastal fishermen • Produced a 'Memorandum perikanan nelayan Pantai Kerian, Perak' to YB Exco Pertanian Perak State and other agencies • Program Dialog Nelayan Pantai bersama YB Exco Pertanian Negeri Perak dan Agensi Kerajaan
55	The River Rangers of Sugut, Ranau (WWF - Malaysia) Sabah	• Promotes and supports management of freshwater habitats by training the local communities to become proactive conservationists • The RIVER Ranger programme focussed on equipping members of the communities with practical skills such as pollution monitoring, pollution mapping, and simple ways to ensure the cleanliness of rivers • Kelab Pemantau Sungai Daerah Sungai Ranau • Collaboration with the Community Development Unit of Ranau's local district office with a training workshop in mid-December 2015 • To learn about the techniques for chemical monitoring • Conducting monthly river-monitoring activities for 9 months
56	Malaysian Nature Society (MNS)	• Aims to secure environmentally sensitive areas, key habitats and species in Malaysia and work towards securing an integrated, comprehensive and representative Protected Area system in Malaysia • River Scientist Programme • Water Vision Programme, aims to inculcate a sense of water conservation amongst youth
57	River terrapin ranger Kemaman (Turtle Conservation Society)	• Brings about the recovery of depleted wild populations of turtles, with particular reference to freshwater turtles, in Malaysia through partnerships with like-minded organisations, individuals and local communities as well as through its programmes
58	Painted terrapin ranger Setiu (under WWF - Malaysia)	• Promotes public awareness on the importance of conserving the natural treasures in Setiu

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No	Platforms	Functions
59	PIFWA Association of Malaysia	• Fosters solidarity amongst licensed and unlicensed inshore fishery • Promotion of sustainable practices, development of networks and business development • Small-scale fishery organisations, community groups, non-governmental organisations • Wetlands/Mangrove conservation
60	Asia Pacific Water Forum	An independent and not-for-profit network organisation that aims to tackles water security issues highlighted in the development agenda in the Asia-Pacific region to improve people's livelihoods and the environment
61	Kumpulan Pengguna Air	• Aims to improve living and income of farmers and develop the sector into a competitive economic entity
		GOVERNMENT
62	Rakan Alam Sekitar	• Approximately 350,000 members of Rakan Alam Sekitar nationwide • Initiated by the Ministry of Natural Resource and Environment (NRE) (currently under Ministry of Environment and Water) • To involve the local community on hands-on activity and citizen science to help government agencies identify and reporting pollution cases to address environmental issues • Conducted many activities, competition and campaigns to raise public awareness • Open to public
63	Lembaga Kemajuan Pertanian Muda (MADA)	• Aims to improve living and income of farmers and develop the sector into a competitive economic entity of farmers' community in Muda's area
64	Majlis Pengurusan Komuniti Kampung (MPKK) Kampung Sungai Jagung	• The local community, farmers • The farms are highly dependent on rains and rivers for water supply
65	IWK Friends of River (Indah Water)	• Cleaning up the river and planting some Ixora New trees • Engaged with key water agencies and local community • Involved 21 rivers across the nation
66	Impact Malaysia (Rebranded from IM4U)	An initiative under Impact Malaysia Integrated that envisions a sustainable and measurable social impact ecosystem driven by youth to bring meaningful and lasting change in their communities works within a multi-stakeholder model
67	Majlis Pelancaran Kempen Kesedaran Keselamatan Di Air 2018 (KPKT)	• Activities: awareness (schools, hospitals), advocacy (MOHE: reviewing appropriate laws and enacting by-laws for enforcement purposes) • Safety in aerial and recreational bodies, capacity building
68	Water Conservation Programme in Schools, Melaka	• A community project which involves rainwater harvesting system installation in the school building located in Melaka for water conservation • Raises awareness on water resources protection and water conservation • Involves schools in Melaka, UPM, Green Growth Asia Foundation, WWF-MY and UTEM
69	Water Environment Partnership Asia (Japan)	First Phase (developing a web-based information platform (WEPA database) for partner countries, Second Phase (knowledge sharing to reach solutions), and third phase (develop and implement wastewater management)
70	Smart Community, Perbadanan Putrajaya	• To connect with citizens and spread information, received feedback and suggestion through technologies • Enabling the infrastructure to build up a smart community towards sustainability • Providing opportunities for citizens to provide feedback and suggestions to address issues as well as develop new opportunities for themselves • Provide opportunities for city residents to get a better education as well as to enrol in schools online • Spread information and awareness through digital technologies

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No	Platforms	Functions
71	The Malaysian Water Association	• Promotes training in management in the water supply • Provides advice and information on water supply and wastewater to the publics • Publicise new technologies and promotes the use of appropriate technology in the water supply and wastewater industries • Enhances the knowledge and skills of its member and promote awareness of water issues amongst the public
72	UN-Water	• Informs policies on sustainably-managed water and sanitation services, monitoring and reporting on key water trends and issues, and inspire actions (World Water Development Report)
		ACADEMIA
73	Water Warrior	• Academia based community that empower citizen of science
74	Ulu Muda Field Research Centre (UMFRC)	• UMFRC aims to promote a scientific field study of Ulu Muda. Earth Lodge prioritises and supports projects that directly contribute to the protection and the better management of the area. Sustainable Tourism and Community-related projects are also encouraged
75	Water Watch Penang	• Organises and conducts educational programmes, field trips, public forums, public lectures and public talks • Publishes and distributes awareness-related articles, pamphlets, journals, periodicals and books • Organises and conducts research works • Liaises with other societies dedicated to similar aims and objective • Undertakes such other activities as may be determined by the Executive Committee of WWP from time to time consistent with the above-stated aim
76	The N Park Condominium Water Saving Project (under WWP)	• Management Practice of Stakeholders Engagement in Urban Water • Management Towards Green Growth
77	Water Conservation Programme in Schools, Melaka	• Further benefits school communities, government and environment • Helps in reducing water usage and bills • Reduces government burden on water supply infrastructures and construction cost • Supports sustainable development goals related to water management and conservation
78	Eco-Schools Programme	• The Eco-Schools Programme is an environmental education and certification programme that encourages schools to take a holistic approach when addressing environmental management and conservation issues that are faced by the school itself as well as the local community surrounding it. It is an ongoing programme that schools participate in each year
79	Sabah Wetlands Conservation Society	• Guided by its objectives, operations at the centre is focussed on creating awareness and support from the general public on the importance of mangroves (and other wetland ecosystems), through conservation, education, recreation, eco-tourism, and research activities
80	Kelab Ekorelawan UKM	• Understands the concept of conservation and preservation of environment • Master in basic environment ecosystem conservation knowledge • Conducts social service in the aspect of environment
81	Kemaman River Terrapin Conservation Project	• Turtle Conservation Society of Malaysia (TCS) was founded out of necessity in 2011 because of co-founders Drs. Chan Eng Heng and Chen Pelf Nyok realised that there was not an organisation or agency in charge of the tortoises and freshwater turtles in the country, despite being home to 18 species of native species.
		BUSINESS
82	Ranhill SAJ Sdn Bhd	• Government-linked companies which • Responsible for water supply services • Conducts awareness campaign programme to promote water conservation and sustainable water consumption amongst local communities and primary school students • Engaged with government agencies and NGOs

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No	Platforms	Functions
83	Syarikat Air Darul Aman (SADA)	• Water supply operator CSR project to create awareness to the public on the importance to ensure a sustainable environment through the water conservation programme.
84	Syarikat Air Kelantan Sdn. Bhd. (AKSB)	• Water supply operator CSR project to create awareness to the public on the importance to ensure a sustainable environment through the water conservation programme.
85	Syarikat Air Melaka Berhad (SAMB)	• Water supply operator CSR project to create awareness to the public on the importance to ensure a sustainable environment through the water conservation programme.
86	Syarikat Air Negeri Sembilan (SAINS)	• Water supply operator CSR project to create awareness to the public on the importance to ensure a sustainable environment through the water conservation programme.
87	Pengurusan Air Pahang Berhad	• Water supply operator CSR project to create awareness to the public on the importance to ensure a sustainable environment through the water conservation programme.
88	Perbadanan Bekalan Air Pulau Pinang (PBAPP)	• Water supply operator • Plays a role in creating awareness on the important role that the commercial and industrial sector has in securing water supplies • Conducts Aqua Save Programme to recognise water-friendly companies, such as industrial corporations, hotels, education centres, government departments and non-business organisation
89	Lembaga Air Perak	• Supply water • Conducts a CSR project in Kuala Kangsar to promote sustainable water consumption amongst local communities
90	Syarikat Air Perlis (SAP)	• CSR project to create awareness to the public on the importance to ensure a sustainable environment through the water conservation programme.
91	Pengurusan Air Selangor	• Water Supply Operator • Information on how to use water efficiently was shared to residents through presentations and interactive sessions • During a 6-month water conservation campaign in Petaling Jaya, it was found that water usage was reduced.
92	Syarikat Air Terengganu Sendirian Berhad (SATU)	• Water Supply Operator • Have water-saving tips on their website to promote sustainable water consumption amongst local citizens

7.7.3 Analysis of Public Participation Platforms in Malaysia

All the 92 identified PPPs shall be evaluated and analysed using the Assessment and Categorisation of Indigenous Involvement. This study will adopt and modified the categorisation and evaluation method conducted by Jackson et al. (2019) and PPP later will be categorised based on a study by Jackson et al. (2019):

1. Agency-driven technical initiatives (AT): The AT type are consistent with current standard practice or a 'Business as Usual' approach, where centralised service provision operates to achieve agency objectives with limited community involvement.
2. Agency-driven community education initiatives (ACE): The ACE type, similarly to the AT type, are governed from the top-down but are distinguished by increased community involvement, although still to achieve agency objectives, typically through information or education targeting behaviour change which may extend to building capacity of community in relation to water or energy system understanding.

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3. Externally driven collaborations (EC): The EC type involves an expanded focus beyond a typical agency need to incorporate broader community development goals at their core, enabled through community involvement in order to meet design parameters and pre-set objectives.
4. Community-driven collaborations (CC): CC type initiatives are community-led with local Indigenous leadership identifying objectives and priorities in relation to broader livelihoods. Partnership with external organisations to achieve those objectives is a key feature of this type of initiative.

The analysis and key characteristic of the PPP is listed below. Based on the analysis, 26 out of 92 PPPs have been identified as Community-driven collaborations (CC). Community-driven collaborations (CC) is type initiatives are community-led with local Indigenous leadership identifying objectives and priorities in relation to broader livelihoods. Partnership with external organisations to achieve those objectives is a key feature of this type of initiative.

Aligned with 12th MP Strategy B1, the Community-driven programmes in environmental conservation need to be increased to empower people to protect and conserve water resources as well as create socioeconomic activities. Various successful initiatives and platforms including the Tagal system and FoR programmes were also included in the community module to expand the implementation. Campaigns to inculcate water-saving habits and precise water use amongst domestic users were also emphasised.

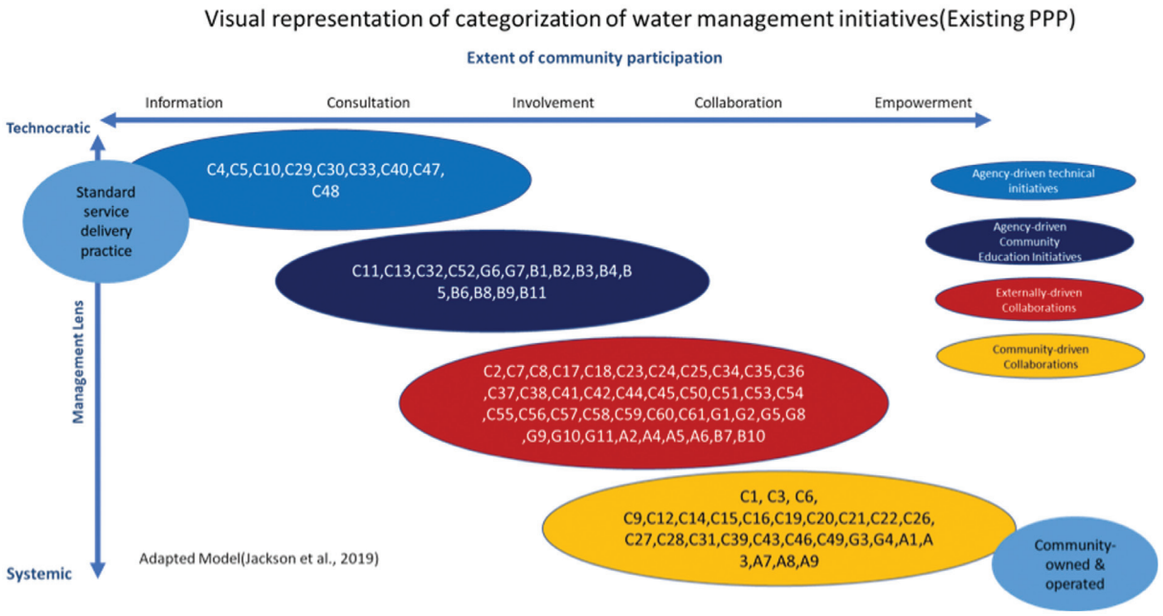


Figure 7.41: PPPs Illustration based on category

7.7.4 Conclusion

It is recommended for establishment of Public Consultation Platforms. Public consultation platforms will be established at the state and district levels for active engagement as part of the water management system. These platforms will be leveraged to support the National Water Council decisions. Capabilities and skills of its members will be enhanced, particularly in conflict resolution and negotiation to ensure the effectiveness of the platforms. Align with that, a strategic communication plan will also be developed for the effective implementation of the water sector transformation.

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Table 7.35: List of PPPs

COMMUNITY			GOVERNMENT	BUSINESS
C1 Kelab Alami, Mukim Tg. Kupang (Forest City)	C21 Friends of Langat River (Selangor)	C41 Yayasan Hasanah	G1 Rakan Alam Sekitar	B1 Ranhill SAJ Sdn Bhd
C2 Green Earth Society	C22 Kelab Warisan Sungai Klang	C42 Nenggiri River Rehabilitation Programme (NRCP) (under GEC)	G2 Lembaga Kemajuan Pertanian Muda (MADA)	B2 Syarikat Air Darul Aman (SADA)
C3 Kelab Alam Sekitar Seri Sempadan Muar Johor KASS	C23 Off River Storage (ORS) Communities, Selangor	C43 Global Environment Centre	G3 Majlis Pengurusan Komuniti Kampung (MPKK) Kampung Sungai Jagung	B3 Syarikat Air Kelantan Sdn. Bhd. (AKSB)
C4 Kedah Water Hero	C24 Wetlands International Malaysia	C44 Environmental Management and Research Association of Malaysia (ENSEARCH)	G4 IWK Friends of River (Indah Water)	B4 Syarikat Air Melaka Berhad (SAMB)
C5 Kelab pencinta Alam Darul Naim	C25 Persatuan Alam Sekitar Selangor	C45 Sahabat Alam Malaysia (SAM)	G5 Impact Malaysia (Rebranded from IM4U)	B5 Syarikat Air Negeri Sembilan (SAINS)
C6 Regional Environmental Awareness Cameron Highland (REACH)	C26 Friends of Kelana Jaya Park	C46 (Trash Hero Kuala Lumpur)	G6 Majlis Pelancaran Kempen Kesedaran Keselamatan Di Air 2018 (KPKT)	B6 Pengurusan Air Pahang Berhad
C7 Consumers' Association of Penang (CAP)	C27 Sahabat Komuniti Sungai Way	C47 CSO Platform for Reform	G7 Water Conservation Programme in Schools, Melaka	B7 Perbadanan Bekalan Air Pulau Pinang (PBAPP)
C8 Community of The N Park Condominium Water Saving Project (under WWP)	C28 SPARK Foundation (partnership with GEC)	C48 Komuniti 1 Malaysia	G8 Water Environment Partnership Asia (Japan)	B8 Lembaga Air Perak
C9 Community of Kinta River Basin (under GEC)	C29 Pertubuhan Gagasan Prihatin Semenyih (GPS)	C49 Friends of Ulu Muda II (FoUMII)	G9 Smart Community, Perbadanan Putrajaya	B9 Syarikat Air Perlis (SAP)
C10 Island Ranger Pulau Pangkor, Perak (under GEC)	C30 International Water, Air & Soil Conservation Society	C50 Eco-Schools Melaka	G10 The Malaysian Water Association	B10 Pengurusan Air Selangor
C11 Persatuan Aktivis Sahabat Alam (KUASA), Perak*	C31 Friends of Sungai Klang Mid Valley	C51 Majlis Gabungan Badan-Badan gabungan Bukan Kerajaan – NGO's Parlimen MARAN	G11 UN Water	B11 Syarikat Air Terengganu Sendirian Berhad (SATU)
C12 Sahabat Hutan Bakau Friends of Mangrove), Perak (under GEC)	C32 Tatana Roots	C52 Wild Asia (International)		

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C13	Pesta Air Kuala Perlis 2019	C33	Friends of Taman Aman	C53	Water Voice (WWF- Malaysia) Sabah	ACADEMIA	
C14	Freshwater for Future (FFF), Forever Sabah	C34	Persatuan Wanita Kg. Mangkok (PEWANIS), Setiu (mangrove rehab) - Nestle program collaborate with WWF Malaysia	C54	Persatuan Pendidikan Dan Kebajikan Jaringan Nelayan Pantai Malaysia	A1	Water Warrior
						A2	Ulu Muda Field Research Center (UMFRC)
C15	MESCOT Initiative, KOPEL, Sabah	C35	Persatuan Perkembangan Wanita Kg. Beris Tok Ku Nestle programme collaborate with WWF Malaysia	C55	The River Rangers of Sugut, Ranau (WWF-Malaysia) Sabah	A3	Water Watch Penang
						A4	The N Park Condominium Water Saving Project (under WWP)
C16	Sabah Wetlands Conservation Society	C36	Sahabat Setiu - Nestle programme collaborate with WWF Malaysia	C56	Malaysian Nature Society (MNS)	A5	Water Conservation Programme in Schools, Melaka
C17	Pertubuhan Sahabat Alam Sekitar Malaysia (SAS)	C37	Setiu Wetlands Discovery (ECOSWED INITIATIVE) - Nestle programme collaborate with WWF Malaysia	C57	River terrapin ranger Kemaman (Turtle Conservation Society)	A6	Eco-Schools Programme
C18	The Malaysian Water Association (Branch)	C38	Love Putrajaya Lake and Wetlands	C58	Painted terrapin ranger Setiu (under WWF-Malaysia)	A7	Sabah Wetlands Conservation Society
C19	Friends of Sungai Batu	C39	Friends of Sg. Penchala under GEC)	C59	PIFWA Association of Malaysia	A8	Kelab Ekorelawan UKM
C20	Inspirasi Kawa	C40	Kina Benuwa Wetland and Mangrove Forest Reserve	C60	Asia Pacific Water Forum Conservation Project	A9	Kemaman River Terrapin
				C61	Kumpulan Pengguna Air		

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7.8 Identification of Existing Training Centre to Propose AACB WST2040 Training Centres

It is reported in Environmental Scan for the Water Supply; Sewerage, Waste Management and Remediation Activities Sector by Institute of Labour Market Information and Analysis (2019) that the current issue of skilled manpower in the water sector is due to the limited training facilities available for upskilling the water sector manpower. This poses an issue to provide a holistic AACB that covers multi-stakeholders in water management. The example of existing training facilities that offer AACB water-related programme is listed in **Table 7.36** below:

Table 7.36: The existing Water training facilities in Malaysia

No.	Agencies	Roles, Functions and Responsibilities	Location
1.	Indah Water Training Centre, Indah Water Konsortium (IWK)	Indah Water established a Training Centre in February 2006. The training centre is a dedicated location for technical training on the sewerage system that focusses on theory and practice for the staff and the wider public.	Indah Water Training Centre Sg. Besi Regional Sewage Treatment Works Lebuhraya KL-Seremban, 57000 Bukit Jalil, Kuala Lumpur.
2.	Institut Pembangunan Modal Insan (IPMI), Department of Irrigation and Drainage	Training facility for the Department of Irrigation and Drainage	1. Institut Pembangunan Modal Insan (IPMI) Zon Utara JPS Jalan Sri Kinta 1, 31650 Ipoh, Perak 2. Institut Pembangunan Modal Insan (IPMI) Zon Timur Jabatan Pengairan Dan Saliran Malaysia Taman Desa Kujid, Pauh Panji 15200 Kota Bharu, Kelantan 3. Institut Pembangunan Modal Insan (IPMI) Zon Tengah Jabatan Pengairan Dan Saliran Malaysia, Cawangan Ampang Kompleks JPS Ampang KM 7, Jalan Air Bukit Off Jalan Ampang 68000 Ampang, Kuala Lumpur
3.	Environment Institute of Malaysia (EiMAS)	The establishment of EiMAS is an important milestone for the Department of Environment (DOE) as the need to enhance staffs' knowledge and skills in the public and private sectors in dealing with environmental management.	Environment Institute of Malaysia (EiMAS) Department of Environment Kampus Universiti Kebangsaan Malaysia Beg Berkunci No 24 43600 Bangi Selangor Darul Ehsan.
4.	Malaysia Water Academy (Malaysia Water Association) (https://www.mwa.org.my/malaysian-water-academy/)	The national association regarding networking and technological advancement for water professionals involved in the complete water cycle. Membership comprises professionals from policymakers, water operators, consultants, contractors, and suppliers.	24-2, Second Floor, Jalan Sri Hartamas 8, Taman Sri Hartamas, Kuala Lumpur, 50480, Kuala Lumpur, WP Kuala Lumpur, 50480

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No.	Agencies	Roles, Functions and Responsibilities	Location
5.	Penang Water Services Academy (PWSA) (http://www.pwsa.com.my/)	The Penang Water Services Academy (PWSA) was jointly founded by PBA Resources Sdn Bhd (PBAR) and the Penang Skills Development Centre (PSDC) in December 2007. On 1 November 2013, the academy was officially certified as an 'Authorised Training Provider' by the National Water Services Commission (SPAN). With this certification, PWSA is now authorised to offer the Water Distribution Competency Course (WDCC) Levels 1 and 2, and Water Treatment Competency Course (WTCC) Levels 1 and 2. At the same time, the PWSA also conducts Malaysian Skills Certification.	Penang Water Services Academy (PWSA) 2nd Floor, Kompleks PBAPP Padang Tembak, No. 36, Jalan Padang Tembak, 11400 Air Itam, Pulau Pinang.
6.	Water Academy, Ranhill SAJ	Training facility for Ranhill SAJ Holdings	Ranhill Utilities Berhad (201401014973) 1091059-K (Formerly known as Ranhill Holdings Berhad) Bangunan Ranhill SAJ Jalan Garuda, Larkin 80350 Johor Bahru. Johor Darul Takzim

According to Malaysia Water Industry Guide (2018), Malaysia Water Association, in 2017, a total of 19,162 staffs were employed in the water industry which majority of them (~77%) comprised non-executives. Executives and managers made up nearly 15%, while meter readers accounted for~10% of the water industry workforce. With the current available training facilities, these unable to ensure effective implementation of AACB WST2040 schemes and programmes that will be covering all water stakeholders in Malaysia. Thus, for effective implementation of AACB WST2040 schemes and programmes, facilities for training the participants concerned are necessary.

To ensure the efficiency, enhancement through continuing skills development of water resource managers and water utility providers at all hierarchical levels should be delivered at dedicated training centres established in strategic locations nationwide. These training centres would also conduct awareness and capacity building programmes for targeted public and community stakeholders towards encouraging greater participatory management.

The existing primary infrastructure of water-related training centre can be enhanced and upgraded through one-stop training centres at national and state levels providing AACB integrated training modules to multilevel target groups from the public, private, and community. AACB training centre shall be a knowledge hub or memory keepers in consolidating all water AACB programmes in a centre.

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The site visit was conducted after a full consideration based on the criteria below:

a. Location
b. Capacity
c. Training facilities and accommodation
d. Accessibility

The training centres were evaluated, and the marks were given. The total marks were 311 and the marks given as tabulated in **Table 7.37**. Based on the field visit, the existing training facilities in Malaysia are sufficient and suitable to be considered as water training centres. The findings will be further evaluated in the workshop. Based on the field visit, the existing training facilities in Malaysia is sufficient and suitable to be considered as a water training centre.

Table 7.37: Evaluation of AACB WST2040 Training Centres during the field visit

States	Training Centres	Points	Summary
Perak	Institut Pembangunan Modal Insan (IPMI) Zon Utara JPS	126	The training centre has halls and classrooms that meet the criteria for the Water Hub. Located in a strategic location within the capital and has all the existing facilities, such as dining halls, bedrooms, and facilities that can be used.
	TNB – ILSAS – Malim Nawar	125	This training centre has good facilities and is in good condition. Very large area with a capacity exceeding 100 pax. However, this training centre is far from the city centre and difficult to access.
Kedah	INTAN Northern Regional Campus (INTURA)	201	INTURA has the highest points for the state of Kedah due to the available facilities, such as halls, classrooms, hostels and dining halls that meet the criteria of using AACB where the capacity is appropriate. The training centre is close to the city centre and easily accessible.
	Lembaga Kemajuan Pertanian MADA	137	MADA training centre is used to train and teach the staff of agriculture who are usually their officers and also the community. This training centre is suitable as a platform for the development of AACB but is not suitable for Water Hub due to the packed timetable used by MADA itself.
Perlis	Institut Latihan Perindustrian Kangar (ILP)	116	ILP Kangar is a centre that has the potential to be used as Water Hub in the state of Perlis because some other options are not suitable to be used due to renovation problems, used by staff and students and small area. With the marks given 116, Institut Latihan Perindustrian (ILP) is suitable as a Water Hub.
Penang	Pusat Inovasi dan Produktiviti Pentadbiran Awam (PIPPA), Universiti Sains Malaysia	104	PIPPA is a training centre under the auspices of USM. They provide the facilities owned by USM, and they also have their own facilities. The score given is the lowest amongst other training centres at 104 because it does not have facilities provided such as bedrooms, dining halls and surau.
	Universiti Sains Malaysia	110	The marks given 110 which is higher than PIPPA because Universiti Sains Malaysia (USM) has facilities and still usable for Water Hub. However, due to USM has students, hence they can only provide the facilities during the semester break.
	MPC Northern Region	200	MPC's training centre is not located in the central of Penang but at Seberang Prai. This training centre has the highest mark of all training centres in Penang because of good facilities and they rarely use the centre. The hall, classrooms, bedrooms and dining room are in a good location and met the criteria as Water Hub.
Kelantan	Institut Pembangunan Modal Insan (IPMI) JPS Zon Timur	144	IPMI Kelantan is one of the suitable training centres in Kelantan. This training site belongs to JPS and they are currently using it as the training centre for JPS staff. The place is in a good location with good looking facilities. They also have a facilitator that can help in AACB programmes.

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States	Training Centres	Points	Summary
	Institut Latihan FAMA Kota Bharu	136	This training centre is located at the centre of Kota Bharu and also near to village area. The building of the area is new as it was built 10 years ago. The facilities are in good condition and have many halls, classrooms and dining room that meet the criteria as Water Hub, but this centre has students and only available during semester break.
Terengganu	Akademi Perikanan Malaysia	135	This training centre is directly under the Department of Fishery Malaysia (DOF). The centre uses this site to train DOF staff by providing the knowledge and skill for the staff. The site is huge and facilities are in good condition. It has a hall, classrooms, bedrooms and also dining room. This centre is also located in the central of Terengganu state and easy access to their community. However, the schedule for training their DOF staff are packed and need to ask permission from the Department of Fishery Malaysia.
	Pusat Latihan & Pembangunan Pengembangan (PLPP), Wilayah Timur	180	The area is near to rural area located in Kemaman, Terengganu. The facilities are old but in a good location. The centre provides training but usually for the agriculture purpose and the schedule is not packed. The capacity also met the criteria.
	INTAN Eastern Regional Campus (INTIM)	311	INTIM has the highest mark as a training centre in Terengganu. This site is located at a good location and can be used every day as they rarely use. The facilities are up to standard as the centre has just undergone renovation. The capacity met the criteria as it is not too huge or small.
Melaka	KEMAS Training Centre Malacca	180	Kemas's training centre has been used for industrial training for services. The centre has candidates for training and usually they use all the facilities provided. The facilities are old but in good condition, and the bedrooms need some renovation.
	Perbadanan Kemajuan Negeri Melaka (MITC)	183	MITC is one of huge centres in Melaka as the place provides huge facilities that can occupy more than 100 pax. They also have small rooms that can be used for training purpose for about 80 pax, however the place does not provide accommodation, as hotel and chalet are available and very close to the centre.
Johor	Institut Latihan Perindustrian Pasir Gudang	86	ILP Pasir Gudang is one of the training centres for industrial services. This site has candidates for the training. As the site is providing the training, hence the facilities are in good condition and also met the criteria. Due to the candidates tight training scheduled, it is impossible to use.
	UTM TTC (Pusat Latihan UTM)	138	This training centre is a centre under Universiti Teknologi Malaysia but it is managed by the private sector to be used for training and teaching purposes. Its strategic location within UTM campus has good facilities in which the capacity is not too large and meets the usage criteria for the AACB programme which only involves 100 pax.
Negeri Sembilan	Institut Latihan Fama (ILFPD)	215	ILFPD is a training centre under the Department of Agriculture located in Port Dickson. This centre has a strategic location and is suitable for AACB programme because it is close to water resources. The facilities are well maintained because they are always in-use and also need to get permission from the Department of Agriculture.
Selangor	Malaysian National Hydraulic Research Institute (NAHRIM)	80	NAHRIM has low points in providing the facilities as Water Hub but NAHRIM has the knowledge to be used for sustainable river basin. They only have an auditorium, chemical lab, biology lab and also the model for a hydraulic power station. They can provide accommodation in the quarters but not for daily usage.
Kuala Lumpur	National Institute of Public Administration (INTAN)	195	INTAN at Bukit Kiara is one of the largest training centres in Malaysia. The centre has various facilities and also in good condition due to annual maintenance. The room can accommodate 100 pax and hostel is also up to the standard, but INTAN has Cadet PTD undergoing training there for about 10 months. The place can be used but the accommodation needs to be considered as they also have candidates for their training. They can also provide facilitators to be trained for AACB programmes.

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States	Training Centres	Points	Summary
Pahang	Institut Latihan KEMAS Kuantan (ILK)	147	This centre is located at Kuantan and has good facilities with 147 points, but this place has their candidates to be trained for industrial services and need permission from the headmaster to use as Water Hub in Pahang state.
	Pahang Skills Development Centre	158	Pahang Skills Development Centre (PSDC) is one of the good facilities in Kuantan, Pahang as the centre gains 158 points to be chosen as Water Hub. The centre is rarely used as the place only opens for training and teaching purposes. The facilities also meet the criteria as it can accommodate 100 pax. Even though the place is huge, the place is easily accessible.
Sabah	Universiti Malaysia Sabah	311	This site located in a good location and can be used every day as it is rarely used. The facilities are up to the standard as the centre has just been renovated. The capacity meets the criteria points as it is not too huge nor too small.
Sarawak	Universiti Malaysia Sarawak	311	This site located in a good location and can be used every day as it is rarely used. The facilities are up to the standard as the centre has just been renovated. The capacity meets the criteria points as it is not too huge nor too small.

Based on the field visit, AACB Sub-Sector proposes 16 training centres to be one nucleus centre, to be supported by several complimenting centres in the same state as shown in **Table 7.38** below:

Table 7.38: Proposed 16 AACB WST2040 training centres

No	States	Training Centres
1.	Perak	Institut Pembangunan Modal Insan (IPMI) Zon Utara JPS
2.	Kedah	INTAN Northern Regional Campus (INTURA)
3.	Perlis	Institut Latihan Perindustrian Kangar
4.	Penang	MPC Northern Region
5.	Kelantan	Institut Pembangunan Modal Insan (IPMI) JPS Zon Timur
6.	Terengganu	INTAN Eastern Regional Campus (INTIM)
7.	Melaka	Perbadanan Kemajuan Negeri Melaka (MITC)
8.	Johor	UTM TTC (Pusat Latihan UTM)
9.	Negeri Sembilan	Institut Latihan FAMA (ILFPD)
10.	Selangor	Malaysian National Hydraulic Research Institute (NAHRIM)
11.	Kuala Lumpur	National Institute of Public Administration (INTAN)
12.	Pahang	Pahang Skills Development Centre
13.	Sabah	Universiti Malaysia Sabah
14.	Labuan	Institut Latihan Perindustrian, Labuan
15.	Sarawak	Universiti Malaysia Sarawak (UNIMAS)
16.	Sarawak	National Institute of Public Administration (INTAN) INTAN SARAWAK Campus

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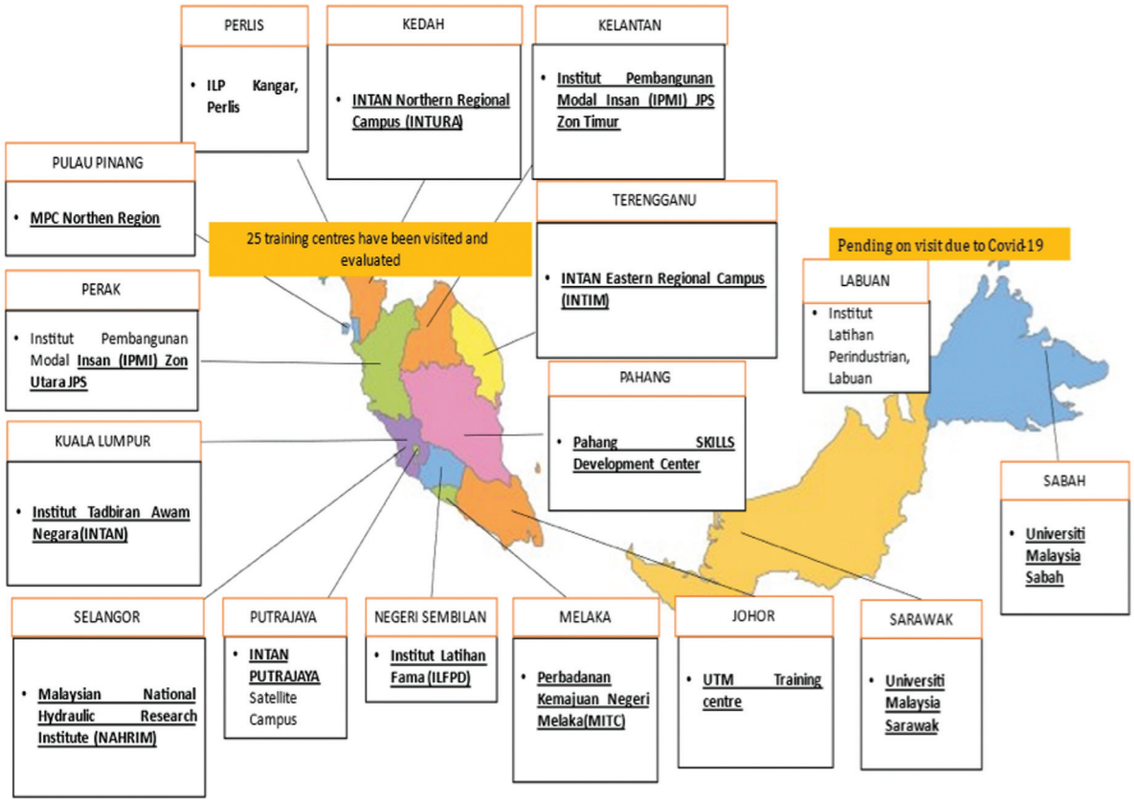


Figure 7.42: Proposed AACB WST2040 training centres

Besides the sixteen training centres visited and proposed, AACB Sub-Sector also proposed additional training centres. The list of training centres was proposed based on quadruple helix clusters (Government, Business & industries, Academia, and Community as listed in **Table 7.39** below;

Table 7.39: Proposed AACB WST2040 training centres

	Proposed Training Centres for Government Cluster
1.	INTAN Northern Regional Campus (INTURA)
2.	Institut Latihan Perindustrian Kangar
3.	MPC Northern Region
4.	Institut Pembangunan Modal Insan (IPMI) JPS Zon Timur
5.	INTAN Eastern Regional Campus (INTIM)
6.	Pahang Skills Development Centre
7.	Perbadanan Kemajuan Negeri Melaka (MITC)
8.	Institut Latihan Fama (ILFPD)
9.	INTAN Kampus Wilayah Selatan (IKWAS)
10.	Institut Pembangunan Modal Insan (IPMI) Zon Utara JPS
11.	INTAN SABAH Campus
12.	INTAN SARAWAK Campus
13.	INTAN PUTRAJAYA Satellite Campus
14.	Institut Tadbiran Awam Negara (INTAN) Kuala Lumpur

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continued

	Proposed Training Centres for Government Cluster
15.	Malaysian National Hydraulic Research Institute (NAHRIM)
16.	INTAN Northern Regional Campus (INTURA)
17.	Institut Latihan Perindustrian Kangar
18.	MPC Northern Region
19.	Institut Pembangunan Modal Insan (IPMI) JPS Zon Timur
20.	INTAN Eastern Regional Campus (INTIM)
21.	Pahang Skills Development Centre
22.	Perbadanan Kemajuan Negeri Melaka (MITC)
23.	Institut Latihan Fama (ILFPD)
24.	INTAN Kampus Wilayah Selantan (IKWAS)
25.	Institut Pembangunan Modal Insan (IPMI) Zon Utara JPS
26.	INTAN SABAH Campus
27.	INTAN SARAWAK Campus
28.	INTAN PUTRAJAYA Satellite Campus
29.	Institut Tadbiran Awam Negara (INTAN) Kuala Lumpur
30.	Malaysian National Hydraulic Research Institute (NAHRIM)
31.	Akademi Pembangunan Belia Malaysia (Kepimpinan) Port Dickson
32.	Institut Kemahiran Belia Negara (IKBN)
33.	Agensi Anti Dadah Kebangsaan
34.	Akademi Imigresen Malaysia
35.	Akademi Koreksional Malaysia Langkawi
36.	Pusat Latihan AADK
37.	Pusat Latihan Rela
38.	Institusi Latihan Kementerian Kesihatan Malaysia
39.	Akademi Kastam Diraja Malaysia
40.	Institut Penilaian Negara (Inspen)
41.	Institut Perakaunan Negara
42.	Institut Penyiaran Dan Penerangan Tun Abdul Razak (Ipptar)
43.	Institut Kemahiran Mara
44.	Institut Kemajuan Desa (Infra)
45.	Akademi Pembangunan Belia Malaysia (Kepimpinan) Port Dickson
46.	Institut Kemahiran Belia Negara (IKBN)
47.	Agensi Anti Dadah Kebangsaan
48.	Akademi Imigresen Malaysia
49.	Akademi Koreksional Malaysia Langkawi
50.	Pusat Latihan AADK
51.	Pusat Latihan Rela
52.	Institusi Latihan Kementerian Kesihatan Malaysia
53.	Akademi Kastam Diraja Malaysia
54.	Institut Penilaian Negara (Inspen)
55.	Institut Perakaunan Negara

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continued

	Proposed Training Centres for Government Cluster
56.	Institut Penyiaran Dan Penerangan Tun Abdul Razak (Ipptar)
57.	Institut Kemahiran Mara
58.	Institut Kemajuan Desa (Infra)
59.	Langkawi Research Centre, LESTARI, UKM
	Proposed Training Centres for Business & Industries
1.	CIGC - Centre for Industrial and Governmental Collaboration, Perlis
2.	KISMEC - Kedah Industrial Skills and Management Development Centre, Kedah
3.	Penang Skills Development Centre, Pulau Pinang
4.	Advanced Technology Training Centre (ADTEC) Taiping, Perak
5.	Institut Latihan Perindustrian Kuala Lumpur (ILPKL), Wilayah Persekutuan Kuala Lumpur
6.	MKRS Training Institute, Selangor
7.	Pedas Industrial Training Institute, Negeri Sembilan
8.	Malacca Industrial Skills Development & Entrepreneurship Centre (MISDEC), Melaka
9.	FMM Institute, Johor
10.	Pahang Skills Development Centre, Pahang
11.	Ranaco Industrial Training Centre (RITC), Terengganu
12.	Industrial Training Institute, Kota Samarahan, Wilayah Sarawak
13.	Pusat Latihan IBS CIDB Akademi Binaan Malaysia Wilayah Sabah
	Proposed Training Centres for Academia
1.	Akademi Pembangunan Belia Malaysia (Kepimpinan) Port Dickson
2.	Institut Kemahiran Belia Negara (Ikbn)
3.	Agensi Anti Dadah Kebangsaan
4.	Akademi Imigresen Malaysia
5.	Akademi Koreksional Malaysia Langkawi
6.	Pusat Latihan AADK
7.	Pusat Latihan Rela
8.	Institusi Latihan Kementerian Kesihatan Malaysia
9.	Akademi Kastam Diraja Malaysia
10.	Institut Penilaian Negara (INSPEN)
11.	Institut Perakaunan Negara
12.	Institut Penyiaran Dan Penerangan Tun Abdul Razak (IPPTAR)
13.	Institut Kemahiran Mara
14.	Institut Kemajuan Desa (Infra)
	Proposed Training Centres for Community
1.	JAKOA Pusat Latihan Damansara Damai
2.	JAKOA Kluang training centre
3.	191 Rural Community centre
4.	State Civil Défense Centres
5.	13 DBKL Community Centres
6.	Pusat Informasi Sungai (Under JPS)

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7.9 Technology - ICT in AACB

Recent innovation and technological change offer opportunities for improving the planning and design of sustainable and effective water-monitoring projects. Over the past few decades, innovation has become one of the main drivers of societal change as a broad range of non-expert citizens have adopted new technologies and integrated them into their daily lives. Today's smartphones have more computing power than the first super-computers, modern cars are full of sensors and mobile internet is available practically everywhere people live. It is recommended for Malaysia to leverage the pervasiveness of such technologies to serve the greater cause of water resource management.

Smartphones, for example, have revolutionised the way water data can be gathered and the role citizens can play in contributing to water monitoring at the local level. A simple click on a smartphone Apps allows users to measure water levels and discharge in small to medium-sized rivers and share the data with the world. These smartphone Apps make it possible to gather a potentially huge volume of additional fit-for-purpose data. These data can provide added value if existing mechanisms for water data collection, storage and access are further developed to provide for better integration of all these non-traditional, innovative data sources. **Figure 7.43** below shows the application of the 10-10 MySTIE framework to the water and Food Socio-Economic Driver.

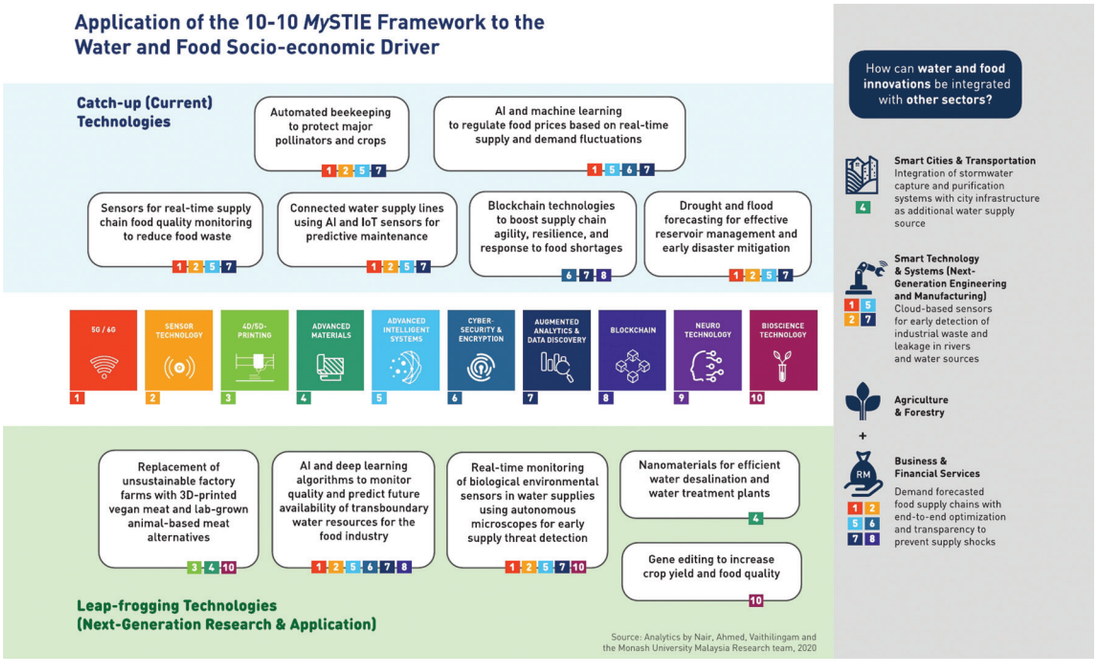


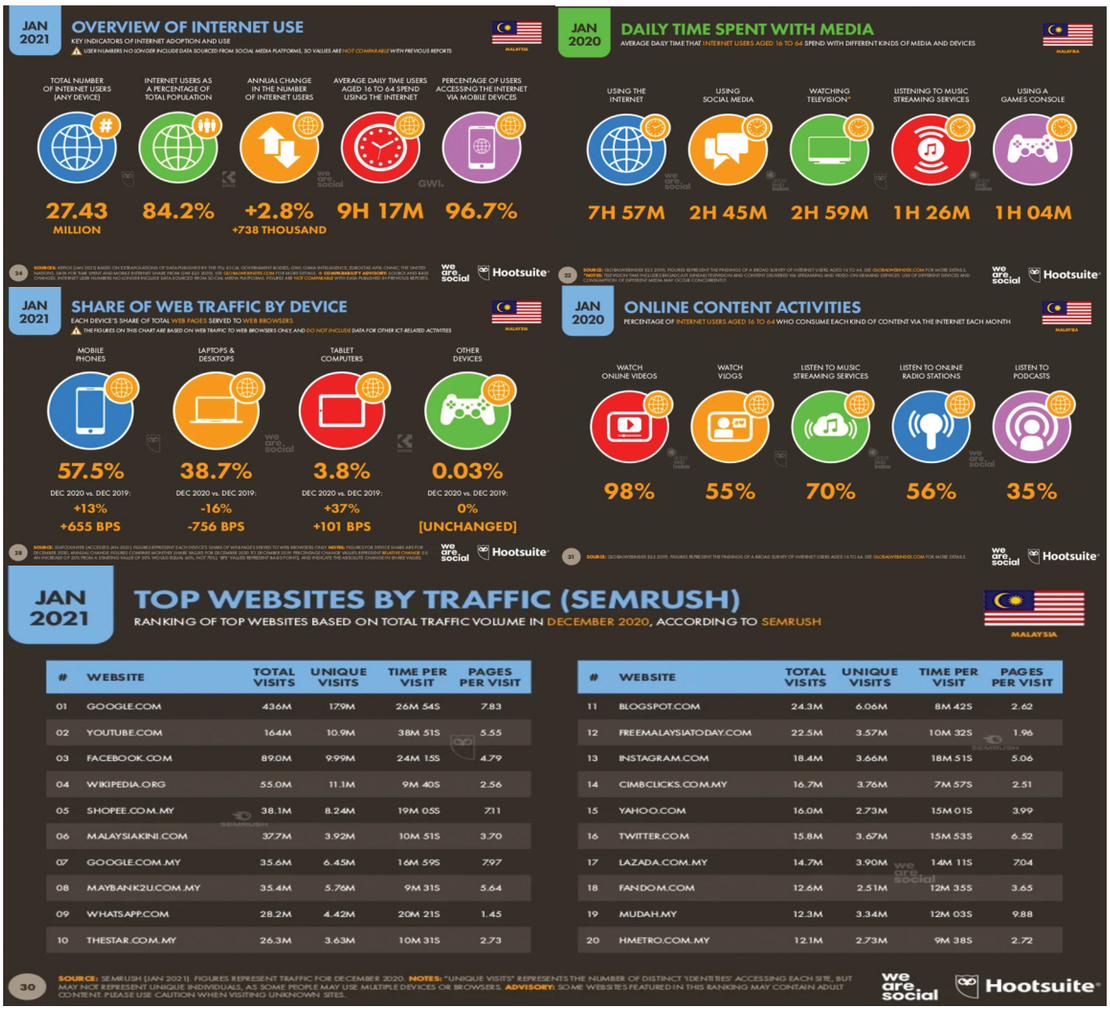
Figure 7.43: The application of the 10-10 MySTIE framework to the water and Food Socio-Economic Driver

As the world is struggling with the Covid-19 pandemic since December 2019, there have been obstacle in implementing AACB. Due to movement control order, the government has aligned the "embracing new norm" which will serve as a guide and reference for the public who will now play a role as frontlines to curb the spread of Covid-19. There have been few guidelines which need to be obeyed with the obligation under the Prevention and Control of Infectious Diseases Act 1988 (Act 342). There has been restrictions in terms of mass gatherings, physical distancing and movement restriction in certain area. The strategies and initiatives to manage the implementation of awareness raising, advocacy and capacity building during the covid-19 outbreak and contain the spread of virus should be highly considered.

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The Covid-19 pandemic has heavily affected modalities of delivery of capacity-development activities around the world (UNESCO, 2020). Some critical components of awareness raising, advocacy and capacity-development activities needed to be carefully evaluated in order to identify the right format, volume, and overall feasibility of delivery considering the fact that learning would be conducted virtually and across various time zones. However, with the development of advanced technologies such as big data, Internet of things (IoT) and IR4.0 and digitalisation, these constraints can be easily overcome. Information is easily available and accessible with internet access. Capacity building can be conducted through seminars, discussions, meetings, trainings can be held online using existing digital platforms. Reach, participation and engagement are also wider where it is not limited to the capacity space of a class or training place.

Hootsuite and We Are Social (2019) stated that, there were 28.00 million social media users in Malaysia in January 2021 (**Figure 7.44**). The number of social media users in Malaysia increased by 2.0 million (+7.7%) between 2020 and 2021. The number of social media users in Malaysia was equivalent to 86.0% of the total population in January 2021 and there were 27.43 million internet users in Malaysia in January 2021. The number of internet users in Malaysia increased by 738 thousand (+2.8%) between 2020 and 2021. Internet penetration in Malaysia stood at 84.2% in January 2021.



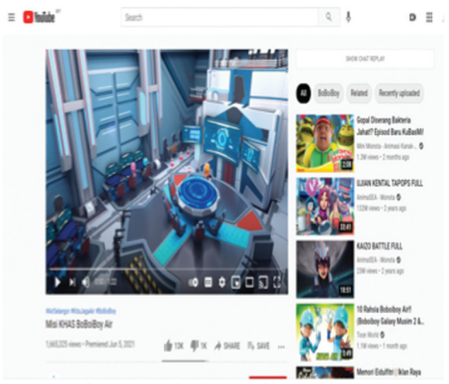
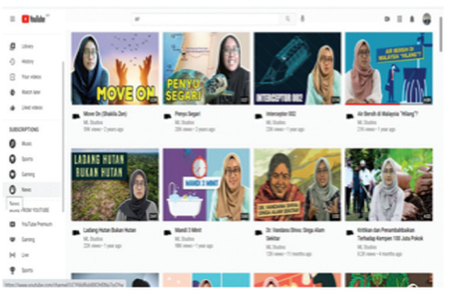
Source: Hootsuite & We Are Social (2019), "Digital 2019 Global Digital Overview," retrieved from https://datareportal.com/reports/digital-2019-global-digital-overview)

Figure 7.44: Digital Information in Malaysia

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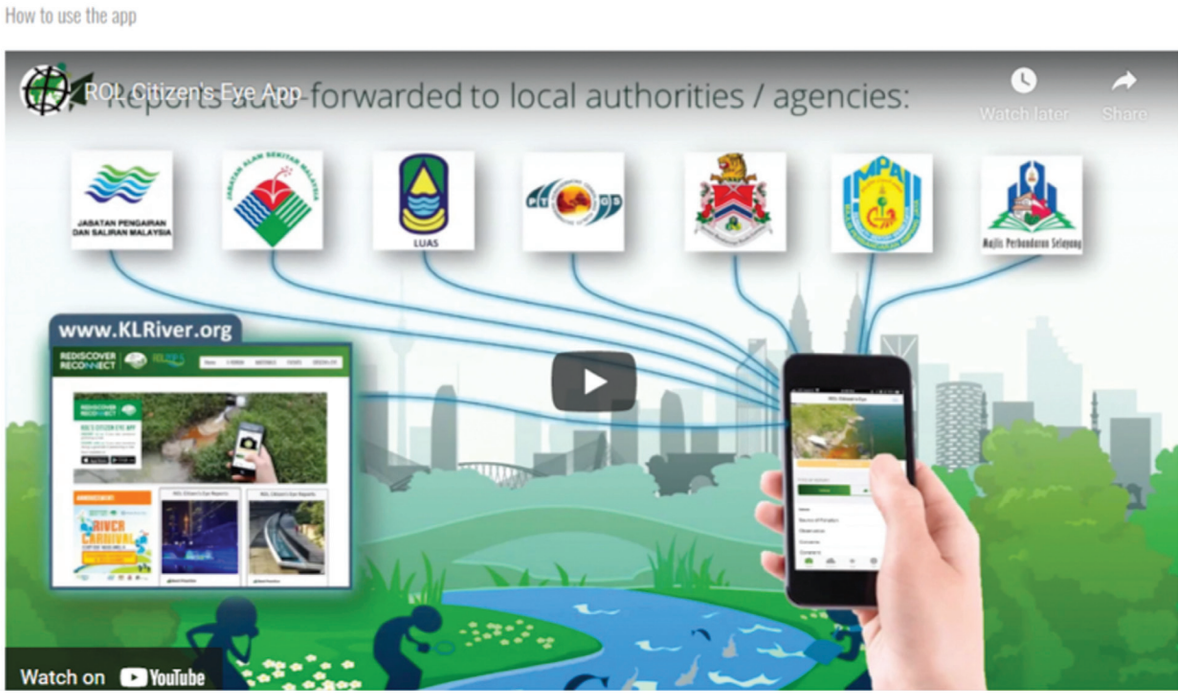
Inspirational Social Media Campaigns for Water Management as stated in **Table 7.40** below:

Table 7.40: Inspirational Social Media Campaigns for Water Management in Malaysia

Example	Details	Picture
KASA social media	KASA has optimised the use of social media such as Facebook and Youtube to provide awareness and advocacy to the people. Several programmes under KASA have been conducted in live streaming. Announcements and information have also been disseminated through KASA social media.	
Air Selangor with Boboiboy (Youtube)	In conjunction with the celebration of World Environment Day, Air Selangor Sdn Bhd has collaborated with Animonsta (Boboiboy) producing a video. The current view of the video in the Youtube channel has reached approximately 1.6 million after 2 weeks being launched.	
The United Nations Development Programme (UNDP) in Malaysia, in collaboration with animation studio Monsta (Youtube)	The United Nations Development Programme (UNDP) in Malaysia, in collaboration with animation studio Monsta, has launched a new public service announcement campaign starring Monsta's popular 3D-animated duo 'Papa Pipi' toraise awareness on river conservation.	
ML Studio (Youtube)	Infotainment platform where any person can share infotainment video.	

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Recent developments in innovative technologies that were developed from low-cost sensors and communication technology to hardware and software integration have brought new set of prospects to the hydrological monitoring. It is possible to engage new actors in water monitoring, with a shift from a reliance on technical experts to the inclusion of non-experts, including local communities. For example, Dewan Bandaraya Kuala Lumpur under the ROL-POL project has launched an Apps called Citizen Eyes. Citizen's Eye is an Apps developed through ROL POP to allow the Public Outreach Programme (POP) participants and the general public to be eyes and ears and to immediately and efficiently record any event or activity related to river management (for example, a good management practice) or perhaps an issue such as a pollution problem (http://www.klriver.org/index.cfm?&menuid=2).



Source: http://www.klriver.org/index.cfm?&menuid=2

Figure 7.45: Citizen's Eye Apps

7.10 Information and RDIC

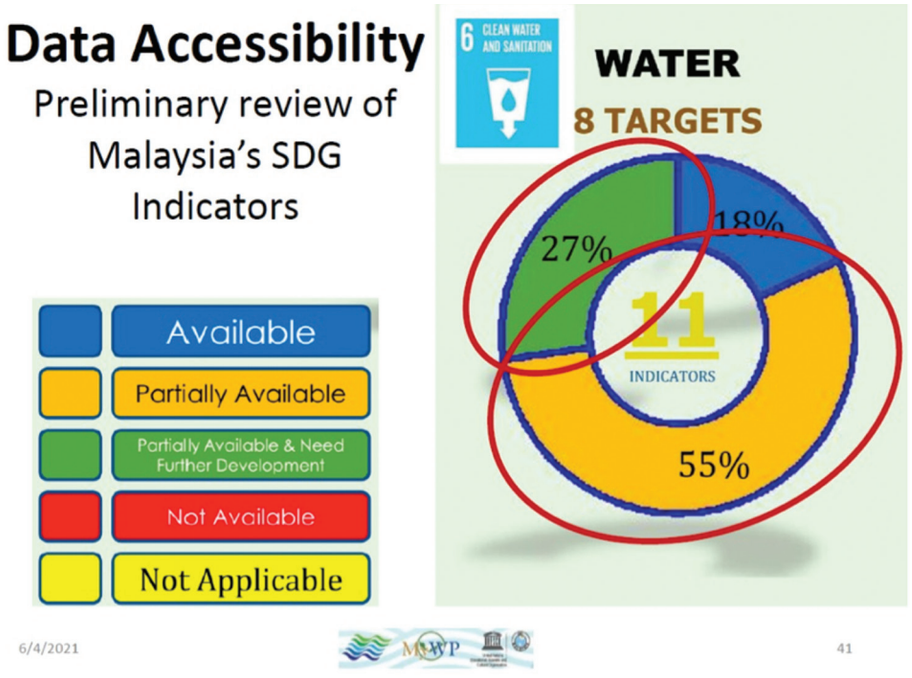
Information and data are very crucial in IWRM, especially in AACB and PPPs as it can facilitate the stakeholder's communication and participation and supporting in decision making. Moreover, quality data and information is very vital for the policy makers as well as researchers to produce better policies and modification of existing policies and guidelines (Ahmed et al. 2018a). Without accurate, intensive, and long-term data acquisition and exchange, the state of the world's water resources cannot be adequately assessed, effective preservation and remediation programmes cannot be run, and programme success cannot be properly evaluated (Glasgow et al., 2004). Malaysia was ranked 34th in the publicised laws and government data dimension of the World Justice Project's Open Government Index in 2015. Responses from Malaysian household surveys and in-country expert questionnaires indicated that disclosure of government information to the public is still limited in terms of scope and quality. Additionally, Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) documented a low degree of willingness to share information and data within government agencies in 2010.

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Study on open data readiness (ODR) conducted by World Bank Group (2017) found few gaps in data availability in Malaysia which were:

1. While data availability is high, access to data is challenging and remains an area of concern amongst data users in Malaysia. The legal framework is fragmented and poses an obstacle to more open data as well as to sustained publication. Minor fees charged for data requests are inefficient and act as a further barrier. There is no single legal framework in the country that determines whether data can be opened to public, and the legal environment for data management remain uncertain. This situation creates a fragmented environment for data management that lacks clarity for both government and the public on how data can be requested, shared and used.
2. Malaysia is a data-rich environment, but not much high-quality data is released in practice. There is little automated inter-agency data exchange, and fees are a hindrance to data users with little benefit to data owners.
3. Due to this data conundrum, NGOs/CBOs, academia, and the business community articulate clear demand, though not all groups are well developed or organised. Case-by-case decision-making for data requests hinders responsiveness and predictability of data provision.

In Malaysia, data relevant to IWRM at basin level are scattered amongst different government institutions. Many institutions collect and manage data and information on water resources, but the quality of data and exchange of information meet obstacles. In 2020, Malaysia was rated 63 marks for SDG 6.5.1 in IWRM implementation. Even though Malaysia improves better that in 2018 with 43 marks. Malaysia is still far behind to achieve 100 marks towards 2030. According to Malaysia Water Partnership, a preliminary review of Malaysia's SDG indicator shows that data accessibility is one of the significant challenges. During the exercise, the consultant unable to provide a proven data as showed in **Figure 7.46** below. Only 18% of data for water targets are available for access.



Source: Presented by Dr. Zelina Zaiton Ibrahim, MyWP at Training Course On Integrated Water Resources Management For Administrators And Water Managers on 7 April 202

Figure 7.46: Data Accessibility for SDG 6

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Thus, UN-water urged an immediate and integrated global response to rapidly improve progress on SDG 6 – 'to ensure availability and sustainable management of water and sanitation for all by 2030'. Therefore, SDG 6 Global Acceleration Framework was launched. The framework is a new, unifying initiative that aims to deliver fast results at an increased scale. It is part of the UN Secretary-General's Decade of Action to deliver the SDGs by 2030.The Framework, coordinated by UN-Water, is driven by country's demand and will unify the international community's support to countries to achieve SDG 6.

Action is driven by five accelerators which also highlight the import of data and information as one of the accelerator factors:

1. Financing. Optimised financing is essential to get resources behind country plans.
2. Data and information. Data and information targets resources and measures progress.
3. Capacity development. A better-skilled workforce improves service levels and increases job creation and retention in the water sector.
4. Innovation. New, smart practices and technologies will improve water and sanitation resources management and service delivery.
5. Governance. Collaboration across boundaries and sectors will make SDG 6 everyone's business.

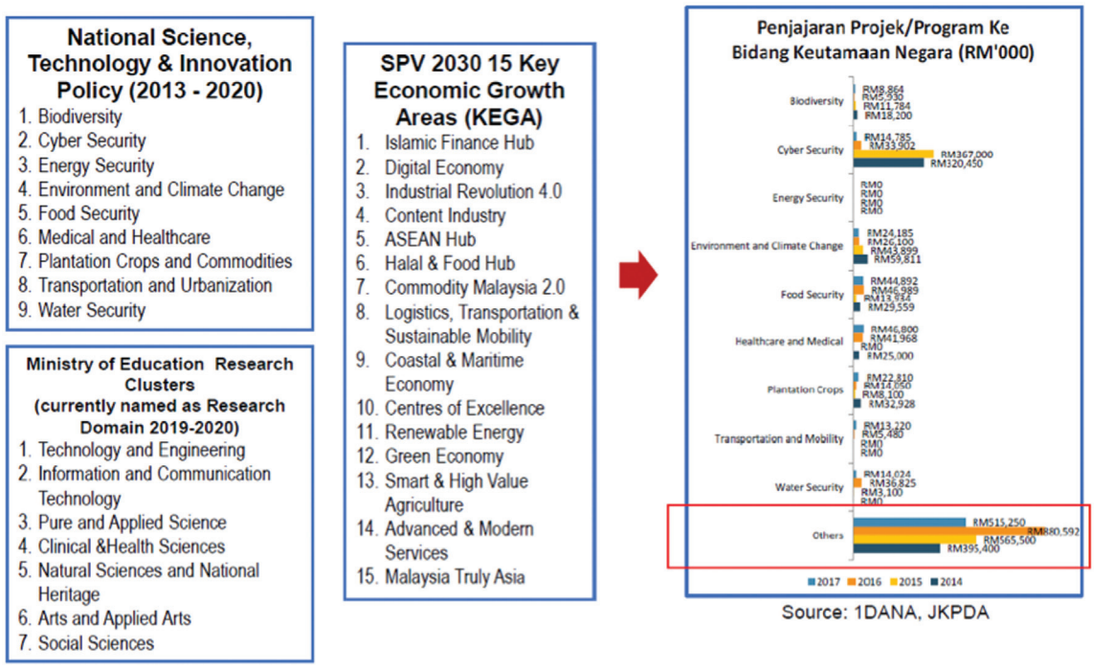


Figure 7.47: SDG 6accelerator factors

In terms of RDIC, especially in IWRM, the implementation is still far lagging. **Figure 7.48** shows that there is Lacking Deep Dive of Science and Research Priorities.

Continuous RDIC (i.e., research, development, commercialisation, and innovation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDCI will effectively facilitate the real time decision making of stakeholders, especially at the local level to promote decision-making processes quickly. In this regard, the stakeholders' mapping, series of dialogue and consultations amongst the federal, state and local level stakeholders will also justify the use of real time data and information coming from RDIC for IWRM.

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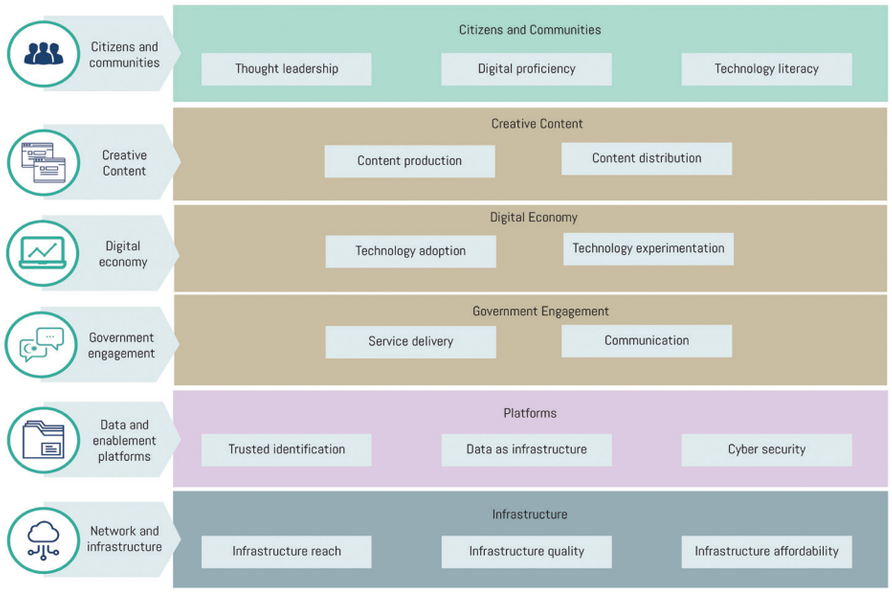


Source: Presented by Datuk Dr. Asma Ismail FASc, at Webinar of Enhancing innovation and Creation of Impactful Research using the 10-10 My STIE Framework on 3 February 2021

Figure 7.48: Lacking Deep Dive of Science and Research Priorities

7.11 AACB Communication Package

To accelerate the implementation of IWRM throughout Malaysia, it is imperative to disseminate information and create awareness on water management that can be reached throughout every level in Malaysia. The communications channel can be illustrated in **Figure 7.49** below,

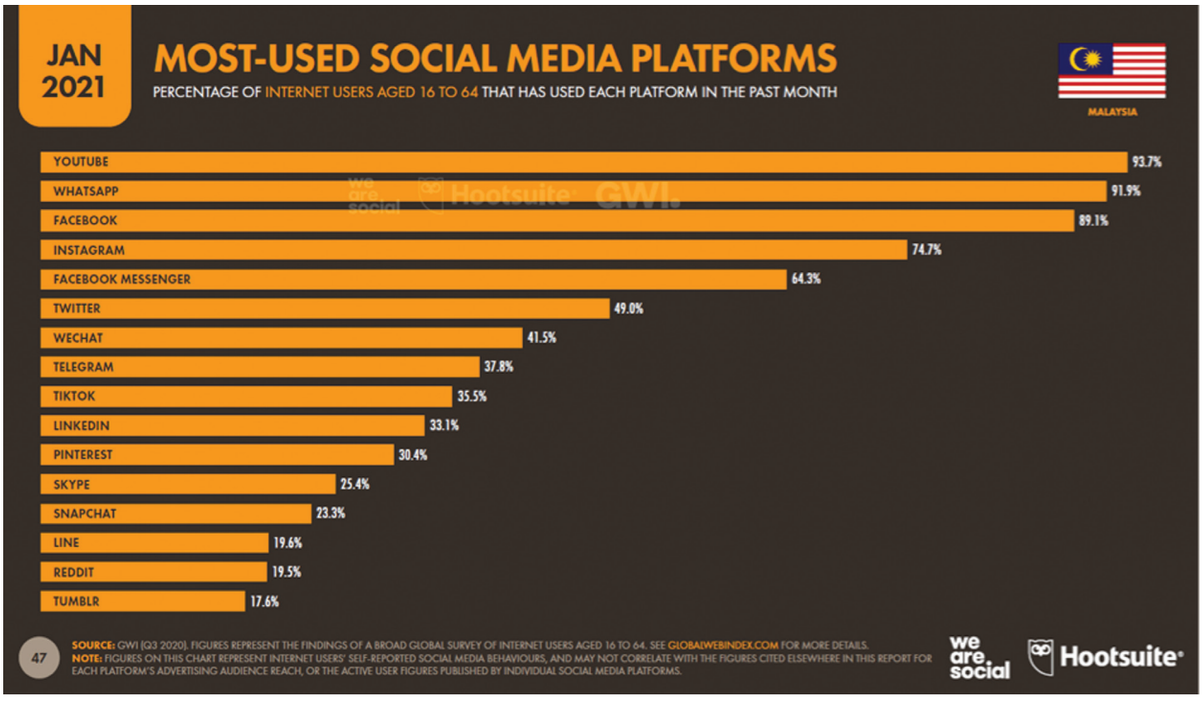


Source: Communications and Multimedia Blueprint (2018-2025)

Figure 7.49: Communication Channels

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One of the effective marketing tools right now is social media marketing through social media platforms. Social media is a phenomenon that has transformed the interaction and communication of individuals throughout the world. Primarily, social networking websites are very popular and have become a part of people's lives. These sites have made a significant impact on an individual's life. However, social media is not only a communication tool for amusement, but it is also an essential marketing tool. There is a constant rise in social networking, and therefore the impact of social networks is becoming stronger every day. Social media is a widely used platform to shape public opinion. They are important business marketing tactics to create new business opportunities, develop a stronger market position or modify consumers behaviour. In developed countries, social media is increasingly used in the day-to-day business operations of many companies, including start-ups, small, medium-sized, and large organisations. The opportunities that social media platforms created can be useful tools to advertise and publicise the AACB programmes.



Source: Hootsuite & We Are Social (2019), "Digital 2019 Global Digital Overview," retrieved from https://datareportal.com/reports/digital-2019-global-digital-overview

Figure 7.50: Most-used social media platform in Malaysia

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The communication tools and channel (Anon, N.D.; Uganga, 2019) that can be considered are summarised in **Table 7.41** below.

Table 7.41: Suggestion for Communication tools and channels

Channel	Function	Audiences	Notes
Digital	Websites, social media, messaging, Apps	All	Low entry cost, quick turnaround, wide reach, targeted approach, opportunities for cross-fertilisation, measurable and scale able
Website	News, events, research findings, background documents	All	Comprehensive repository of information. Microsites from other existing websites such as DOE/KASA, can be expanded for AACB at low cost. Various other AACB platforms internationally
E-mailings	Targeted call to action on specific topic/event	Private sector Academia	Use sparingly, on defined topics for selected audience
AdWords	Drive traffic online, promote events	Specific audiences	Boost visitors to digital channels through targeted display bannering and search engine advertising
Social/ Professional Media Facebook, Twitter LinkedIn, YouTube, Instagram)	News, videos, animation, interactive campaigns, discussion, competitions, CoPs	All with internet access	Quick dissemination, Scope for audio/visual. Promotes interaction/mobilisation/cooperation. Use hashtag (#) and campaign handles
Chat	Alerts, crisis response, technical info, group sharing, feedback tool	Selected stakeholders	Quick dissemination, suited for crisis communication or rapid response
E-newsletter	News, events, insights, research findings	All	Quarterly newsletter, gradually replaced by social media
E-Surveys	Annual AACB survey	All	Monitoring and Evaluation on AACB activities Communication needs assessment
Massive Open Online Courses (MOOCs)	Technical Communications Skills on platforms	Government NGOs	Build capacity amongst AACB communicators
Applications (Apps)	Dedicated information sharing around for instance environmental news, wildlife incidence, or anti-poaching, Public reporting for environment violations	Academia Government Private Sector	Apps are useful for research, learning or to convey real-time information around a specific subject.
Environmental Education Centres (EECs)	Focus on walk-ins and the natural history of surrounding area. Information centres/ corners at school and universities	Academia Tourist (MOTAC) Communities	Broaden scope EECs to increase impact, integrate with digital outreach & curricula. Attract private partners
Schools and institutions	Institutions of formal and informal education can highlight CEPA issues	Academia	Opportunity to leverage the AACB strategy through updating of science and physics curricula
Video/Animation	Visualise Environment commission work, explain (ecosystem) processes, promote environment commission internationally	All	Produce regular videos for Environment commission online platform

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continued

Channel	Function	Audiences	Notes
Theatre & EnviroComedy & Film, Drama	Highlight unsustainable practices; communicate environmental issues in an entertaining and accessible way	Communities Academia General population	Sketches and comedy sessions can inspire behaviour change at grassroots level
Events	Information on environment commission activities, feedback from public	All	Opportunity for face-to-face interaction, on the ground visibility
Summits/ Conferences	Profiling Malaysia internationally, present research, policy development.	Collaboration partners NGOs Governments Academia	Highlight best practices, demonstrate success stories, obtain latest AACB insights
Media Day	Day of fun and games with media to build relationship	Media	Highlighted plans for the year to media, build relationships.
International days	Raise awareness on environment.	All	International/national environment day-Public calendar to promote public participation
Awards	Celebrate and recognise actors that engage in sustainable environmental practices	All	The eco-awards
Media	Directly through press releases/ events and indirectly through op-eds and advertising	Media	Build relations, prioritise larger media houses and specialised trade titles. Always look at cost-benefit.
Press releases	Focus on specific or urgent topics important for Environment commission	All	Provide newsworthy releases, written accessible, with news hook and pictures, email to staff.
Press briefings	Media info. session with senior official on important or urgent topics. Effective and low-cost.	Media	Set clear outcome and message, choose time carefully and issue press release if needed
TV	News bulletins, environmental programmes, documentaries	All	Establish partnership to feed information into environmental programmes.
Radio	News bulletins, environmental programmes, public service announcements (PSAs), field visits, events.	All	Establish partnership to feed information into environmental programmes, advertise selectively, makeuse of language services
Articles	In-depth information on a certain topic, provide background and context	All	Background, research findings, enviro columns, human-interest stories. Collated by AACB liaisons
Outdoor	For specific messaging along targeted routes or at key points where people gather. Static or electronic billboards	Communities Tourists	High visibility, but expensive. Conduct Cost Benefit Analysis before deployment, carefully measured impact.
Print advertising	Vacancies, announcements	All	Expensive and impact unclear. Conduct Cost Benefit Analysis before deployment, carefully measured impact.
Media Monitoring	Clipping of print material and logs of broadcasts. Google Analytics & social media reports	Government AACB Sub-Sector	Use analytics to measure quantity and quality of coverage. Online analytics feed into Monitoring and Evaluation process.

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continued

Channel	Function	Audiences	Notes
Capacity Building Programme	General environment communication & leadership Capacity Building programme and targeted group programme (Stakeholders) such as wetland preservation	All	Classroom Self-paced Open Classroom
Capacity Building Module/Course	General environment communication & leadership Capacity Building programme and targeted group program me (Stakeholders) such as wetland preservation	All	Digital Book E-book Hands-on Book/flyers/posters/guideline
Podcast Series		All	

Therefore, AACB Sub-Sector proposed communication package in **Table 7.42** below:

Table 7.42: AACB Proposed Communication Packages

Communication package	Recommendations	Ministries/Agencies	Budget
Short film or infotainment video through social media platforms	Collaborate with video content platform such as ML Studio to produce video of educate and disseminate information and awareness on water related issues.	KASA, DID, SPAN, Water Operators, NGOs	RM100,000 yearly
Animated short slots	Collaborate with interactive animation company such as les Copaque (Upin and Ipin) and Animonsta (Boboiboy) to produce video of educate and disseminate information and awareness on water related issues.	KASA, DID, SPAN, Water Operators, NGOs	RM500,000/yearly (Appendix C)
Radio airtime	Environment/sustainability segments, Advertisement	KASA, DID, SPAN, Water Operators, NGOs	RM100,000 yearly Based on radio station airtime rate (Appendix D)
TV airtime	Advertisement, interview, Special appearance, documentary programme	KASA, DID, SPAN, Water Operators, NGOs	RM100,000 yearly Based on TV station airtime rate (Appendix D)
Webinar	Schedule Webinar series with water experts that can be shared through social media platform such as YouTube and Facebook	KASA, DID, SPAN, Water Operators, NGOs	RM500,000 yearly
Pamphlets at various public location	River basin information/map at school/ university, local authority's office, community centres and tourist guideline map at tourist attraction place	KASA, DID, PLAN Malaysia	RM500,000/yearly
E-Book Module training	AACB WST2040 module training will be open published at EPU website as references to all	EPU	-
Drama, film	Promote river in the film and drama	FINAS, Tv station, Drama producer	-

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continued

Communication package	Recommendations	Ministries/Agencies	Budget
Podcast Series	Podcast is one of the platforms used for awareness raising, advocacy and capacity building for public participatory platforms on WST2040 Roadmap. The series will discuss on WST2040 and IWRM and broadcast to the public, both specialists and non-specialists aiming to shape their opinion and perceptions on water related issues. The duration of each podcast episode is thirty (30) minutes. The series will be hosted on a podcast channel and distributed by Spotify to a global audience. The channel will not expire, and it does not work like a paid website url links. It is one of the simplest, fastest growing and highly engaging digital platforms.	KASA, AACB	RM40,000/one time

7.12 Finance

Since water management is sectorised and fragmented, the fund and financial sector are also sector-based. Some awareness, advocacy and capacity building of water management are also based on the corporate social responsibility of industries and businesses. The current Finance (Economic and Financial Instruments) for AACB and Public Participatory Platforms is funded by the government (both Federal and State), private business & industry through corporate social responsibility (CSR) programme, NGOs/CBOs through fund crowdsourcing and membership and academia through research grants. Some capacity building programmes can be attended for free while others imposed fees.

- Federal Fund-budgets and funds from ministries and agencies responsible for water. In Malaysia Budget 2021, Malaysia allocated:

    1. RM50 million to address river pollution.
    2. RM40 million over 5 years to strengthen environmental quality monitoring enforcement.
    3. RM10 million for the Integrated Island Waste Management project in Johor & Terengganu
    4. RM400 million allocation under TAHAP including RM70 million Ecological Fiscal Transfer to ensure sustainability of biodiversity (remarks: need to explore more)
    5. RM20 million for Biodiversity Protection & Patrol Programme to recruit 500 former military & police as well as Orang Asli
    6. Special reward for whistle-blowers such as on river pollution which led to Klang Valley water disruption.

- State Fund- budgets and funds from ministries and agencies responsible for water at state level.

For example, in Selangor's budget 2021, RM200 million Water Pollution Issue Solution, RM1 million Friends of River and Pantas Luas Squad (River Patrol)

- NGOs Fund- funds from non-government organisation using crowdsourcing, collaboration grant or project and membership.

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For example, the National River Care Fund, a small Grant Programme is an initiative established by Global Environment Centre (GEC) to support the local community, community-based organisations/non-profit organisations to pursue their river conservation initiatives.

- Business & Industry- fund through cooperate social responsibility. Business and industry collaborate with other stakeholders to perform AACB programme as part of organisation' sustainability programme and corporate social responsibility.
- International Fund- fund from international organisation such as UNDP, Cap-Net.

Continuous Federal funding is vital for the rehabilitation and restoration of river basin management. To accelerate the IWRM implementation, there is an immediate and urgent need for Finance (Economic and Financial Instruments) to fund free capacity building programmes for the public.

8.0 CONCLUSION AND RECOMMENDATIONS OF THE SUB-SECTORAL STUDY (PROPOSED MISSION CRITICAL PROJECTS IN LINE WITH THE ROADMAP REQUIREMENTS, INCLUDING KPIS AND TARGETS (FOR EVERY STRATEGY) AND IMMEDIATE IMPLEMENTABLE PROPOSALS/ PROJECTS FOR EACH SUBSECTOR, TO BE ACHIEVED DURING EACH PHASE AND THE IMPLEMENTATION TIME FRAMES)

A total of 46 stakeholder's engagements have been conducted by AACB throughout the study which 24 engagements were field visit to training centres. Meanwhile 22 engagements with related ministries, department and agencies were conducted.

AACB has established 4 clusters, namely Government Cluster, Business & Industry Cluster, Community Cluster, and Academia Cluster. The roadmap of AACB WST2040 has been proposed based on the clusters, respectively. It has been developed based on the gaps identified through the policy review, literature review, qualitative research, and stakeholder's engagement.

In line with EPU's terms of reference, AACB Sub-Sector's scope of the study is to:

1. Review and analyse current policies with a view of improvement for the meaningful implementation of IWRM towards WST2040.
2. Undertake comparative strategy analysis/business models with other nations.
3. Study and consider the current global markets towards making the water sector a dynamic new economic sector capable of driving the nation's GDP growth in the future. Therefore, AACB Sub-Sector will focus on the following issues:

    i. Public Participatory Platform (PPP)
    ii. Training Modules (based on Quadruple Helix Model)

4. Prepare a transformation strategy and initiative implementation framework for each of the 4 Phases including the Implementation Agencies, Estimated Budgets and Main Target Achievements Based on the Analysis Undertaken and Expert Reviews with the progress of the study.
5. Undertake consultations with stakeholders and experts to finalise the proposed strategies and initiatives of the nation's Water Sector Transformation.
6. Prepare a complete Roadmap for the National Agenda on the Water Sector Transformation 2040 for the various Ministries' and Agencies' information and guidance for the implementation of programmes and activities towards achieving the targeted Transformation objectives.

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To analyse the level of effectiveness of the water management in Malaysia, AACB Sub-Sector has reviewed 26 Policies and Management plans and did some comparison with water management styles of eight countries and one international organisation, namely the United Kingdom, Mekong River Commission, the Philippines, South Korea, Singapore, Finland, Australia, Sweden, and Germany; 92 existing Public Participatory Platforms (PPPs); and looking through several existing water-related awareness and capacity building modules. This report lists out, analysed and identified some of the gaps related to the important elements as stated earlier. A total of forty-four stakeholders' engagement has been conducted involving quadruple helix stakeholders. This involved twenty- three field visits, six webinar series, two workshops, two focus group discussions and eleven meetings.

AACB Sub-Sector expects and hopes that the WST2040 will produce much more effective awareness, advocacy, and capacity building programmes, projects, and plans of IWRM and its related sub approaches. Understanding that the capacity building will be focussing on two important sectors, i.e. institutions and communities. AACB Sub-Sector is very much exploring the process of how to make public participatory platforms work more effectively, and to be sustained over a longer period. This capacity-building development approach will be focussing on the collaboration of state and local government agencies, local communities, and local universities, schools, and other centres of learning and education, plus partners at various levels and scales. AACB Sub-Sector has proposed three pilot river basin sites, namely Sg. Muda Basin in Kedah, Sg. Petagas Basin in Sabah and Sg. Baram Basin in Sarawak.

Based on the comparative study and stakeholder's engagement, the key findings based on the five areas can be summarised as the following:

A. People (AACB and PPPs)

1. Trying to understand the ongoing issues of AACB and sustaining a good level of vigour amongst the different kinds of PPPs.

   Even though there had been quite a good number of awareness campaigns and initiatives being conducted, nevertheless the level of awareness amongst stakeholders was still found to be relatively low. Many water issues are still happening such as water wastage, and water pollution. Awareness-raising activities are needed to help inform and sensitise decision-makers including those who are in the sectors such as agriculture, energy, health and safety, and finance; about water-related challenges.

   Advocacy: There is a need to use certain awareness raising strategies to serve as a key method for informing policymakers, the public and academe about the benefits of IWRM, water resources sustainability, and economic sustainability too.

   Capacity building: training, knowledge sharing, generation and dissemination of knowledge, can take place through formal, non-formal, and informal educational training.

   Public Participatory Platforms: There is a need to institutionalise community involvement in the various kinds of Public Participatory Platforms.

2. Roles of the quadruple helix stakeholders in supporting the WST2040 and contributing to public participatory platforms are important to ensure successful community participation in IWRM implementation.

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Involvement of the quadruple helix stakeholders as important actors on the public participatory platforms will be vital for the successful implementation of IWRM. There are four main clusters of stakeholders, namely Government, Academia, Community and Business & Industry.

These four main stakeholders have common and differentiated roles and responsibilities to be put into practice. They should be made aware of their roles, potential contributions and how to overcome some of the challenges in implementing IWRM.

3. Capacity development of institutions and communities is required to strengthen public participation in IWRM.

B. Governance (Policies, Legislations, Regulations, Institutions, and Guidelines)

The water resource management in Malaysia has been sectoral and fragmented for decades. Although several programmes and training have been developed at government, community, academia and business & industry levels to create awareness on the importance of water management to support the national policies, there is still a general lack of understanding on water management, especially IWRM. Hence, the development towards water sector transformation has been quite a challenge. Thus, there is an urgent need to make progress in streamlining the individual sectoral policies. By doing this, it will help each department to achieve their goals and they can identify any gaps in the implementation and enforcement.

The importance of water management was emphasised in some of the national policies. There were strategies, and plans relating to water-related awareness-raising, advocacy, capacity building and public participatory platforms. Many of the existing programmes have an emphasis on the involvement of all levels of the community via the collaboration of Quadruple Helix stakeholders which are Government, Community, Business & Industry and Academia.

However, several national policies only emphasised on water supply and demand and infrastructure on water supply and drainage to ensure national food security. For instance, "Dasar Agromakanan Negara" focusses mainly on sufficient quantity and high quality of water for agriculture. No awareness, advocacy and capacity building mechanism and tools of water management was embedded in some of the policies being looked at. The role of water in development is not recognised fully in this policy.

Some policies are lacking in terms of risk assessment and management. To quantify and estimate the true value of water, the policy needs to include the risk management and assessment of water resources and other related resources. In water planning, risk management can provide a useful information for assessing the risks, and gauge to a certain extent the community values, and fulfil management objectives. The risk management conducted will ensure sufficient and sustainable water resources for the maintenance of human health, water-related economy, environmental health, and today's lifestyle. Risk assessment also aims to facilitate informed decision making for a sustainable water supply for all types of use.

C. Information and RDIC (Information, Planning, O&M, Research & Development)

Malaysia was ranked 34th by the World Justice Project's Open Government Index in 2015. Responses from Malaysian household surveys and questionnaires indicated that disclosure of government information to the public is prohibited and if allowed, it is much limited and controlled. Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) had reported a low degree of willingness to share information and

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data amongst government agencies in 2010. A study on open data readiness (ODR) conducted by World Bank Group (2017) had found some gaps in data availability in Malaysia.

1. Accessibility to data is challenging and remains an area of concern amongst data users in Malaysia. The Official Secrets Act (OSA) 1972 binds government officers, and data and information sharing are much controlled and regulated. Thus, the legal framework needs to be reviewed by relevant expert authorities to improve the situation.
2. Malaysian government agencies and ministries are active in collecting and analysing data, but these data are generally not made public. There are still limitations and challenges existing in inter-agency data exchange and sharing, and in making some data publicly known.
3. There is some sort of a data conundrum situation in Malaysia. Several institutions that are monitoring the performance of countries in matters about SDGs and as such, are still reporting that the relevant data and information needed about Malaysia is still limited, and at times being reported as being not available. But of late, the Department of Statistics Malaysia is seen to be more forthcoming in dealing with the situation and had been quite proactive of late in collating and sharing information about various aspects of the country, including in data and information related to the 17 SDGs and 169 targets in which some data about IWRM are also included.

In Malaysia, data that are relevant for IWRM implementation at various levels and scales are collected and recorded by several government institutions and agencies across different ministries. These institutions collected and managed data and information on water resources, but accessibility and sharing of these data with different sectors of the community are much controlled. Generally, it is not easy to obtain certain specific data for decision making by an authority if these data are not measured and collected by that authority themselves. Inter-agency and inter-sector sharing of data and information about IWRM is still quite a challenge in Malaysia.

D. Infrastructure, facilities, and legal instruments.

1. A limited number of water training centres.

   Currently, there is only a limited number of IWRM training centres around the country, thus, the training about IWRM amongst the community is much limited. The relevant authorities and other stakeholders concerned need to find better ways and strategies to step up the rate of IWRM training, and understanding amongst all sectors of the population, and communities.

2. Capacity building during pandemic Covid-19 situations.

   The Covid-19 pandemic has indeed affected modalities of delivery of training materials and capacity development activities around the world (UNESCO, 2020). Some critical components of awareness-raising, advocacy and capacity-development activities would include the need to identify the appropriate ways of combining the instruction and discussion via online platforms, face to face interaction, hands-on experiences sharing, etc.

3. Training programmes based on IWRM modules.

   Personnel involved in water resource management, and water services provision at Federal and State levels, and their partners and collaborators, at various levels and scales are anticipated to request and demand appropriate training on IWRM. The trainings including those that are based on IWRM modules are linked to several SDGs and other integrated and holistic approaches toward sustainable development

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like geoparks, ICZM, biosphere reserves, world heritage sites, etc. To strengthen the public participation, training programmes based on IWRM modules are required to enhance the capacity of quadruple helix stakeholders namely the Government, Academia, Business & Industry, and Community & NGOs.

E. Finance (Economic and Financial Instruments)

Since water management has been sectorised and fragmented, the funds and financial help are also sector-based. Therefore, some awareness, advocacy and capacity building programmes for water management can also be based on the corporate social responsibility initiatives of industries and businesses. The current funds and finance (Economic and Financial Instruments) for AACB and PPPs, including via funds from government (at both federal and state levels), private business & industry through corporate social responsibility (CSR) programmes, NGOs/ CBOs, crowdfunding and other kinds of sponsorship too. There is a need for a sustainable flow of funds for AACB towards IWRM.

Based on the findings, the recommendations are as follows:

Empowering People in Transforming the Water Sector

- Strengthening AACB and PPPs in Malaysia via AACB WST2040 programmes based on the quadruple helix model, i.e. comprising the main four clusters of stakeholders namely the Community & NGO, Business & Industry, Government, and Academia. It is suggested that relevant agencies should take special non-structural measures such as campaigns, advertisements, water fairs, trainings and such to raise the awareness and capacity building of the people to enhance their participation in the effective water resources management platform.[5]

- Empowering people and developing capacity building via the Quadruple Helix (Government, Business & Industry, Academia, Community) with IWRM and IRBM knowledge using several communication strategies.[6] Capacity building and continuous improvement of stakeholders can be strengthened via enhancing communication skills, river care knowledge, and environmental subjects. Soft skills training on public outreach will enhance the awareness and capacity of all stakeholders. Moreover, enhancing the River basin understanding of the stakeholder's will be effective via developing awareness that is in line with IWRM, IRBM, ICZM, etc. Enhancing and promoting river address, developing a simple brochure, video, etc. will also enhance the awareness of the public on IWRM.

- Reiterate importance of rivers as water resources for human and the environment at school. The topics related to water have been incorporated into school curriculum, this includes the syllabus of preschools, primary and secondary schools. This means that the topics are related to water have already been part of the formal education. However, it is possible that students might have forgotten or still not aware that water is actually come from the rivers. In this regard, teachers should be trained and retrained, where they should learn more case studies related to river management, thus they can share these case studies with students when teaching water related topics in the syllabus. A strong TVET ecosystem will be a game changer that will create future-ready talents in meeting the industry demand. In this regard, there is a need to incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers.

[5,6] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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- Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management. Researchers at HEIs have vast experience in research, training and consultation, hence they should share their expertise with stakeholders, namely government, industry and community. For government, researchers can provide technical inputs as subject matter experts (SMEs) to government officers, as well as to represent Malaysia or assist government officials in international and regional negotiations. Besides, researchers also can become the memory keeper for the relevant ministry/agency to ensure sustainable knowledge transfer. For industry, researchers can work closely with professional bodies to provide professional training courses or become consultants/ technical advisors to selected industries. As far as the community is concerned, researchers can take the leadership and proactive measures to outreach to the communities. Besides, researchers can also promote the concept of citizen science to enhance community engagement in sustainable water resources management.

- Enhance PPPs and AACB Through Digital Learning Spaces. It is recommended for Malaysia to leverage the pervasiveness of technologies to serve the greater cause of water resource management. To adopt suitably advanced medium technology to spread awareness to the IWRM stakeholders.

- To activate and empower the existing environmental volunteers and community-driven programmes e.g.: Rakan Alam Sekitar, Friends of River and updated them with info/status on IWRM in their community. Community-driven programmes in environmental conservation need to be increased to empower people to protect and conserve water resources as well as create socioeconomic activities. Various successful initiatives including the Tagal system and FoR programmes will also be expanded. Campaigns to inculcate water-saving habits and precise water use amongst domestic users and farmers will be intensified through community platforms such as Kumpulan Pengguna Air.

Strengthening Governance at all levels

- Strategic alliances with renowned regional and international water research and training centres. The National Research and Capacity Building institutes to enter into strategic alliances with renowned regional and international water research and training centres. Regular participation in reputed water-related international water fora by the civil servants will enhance their leadership skills and capacity in water management.

- Collaboration with government agencies and relevant stakeholders. Partnerships between agencies and joint programmes between government sectors as well as collaboration and smart partnership help build linkage to enhance knowledge and help foster connectivity between agencies to develop a common sense of ownership.

- Appropriate tools that can be used by government officers and local community to monitor the river water quality. Local government should be given the appropriate tools/applications/software to measure/ monitor the quality and quantity of the waters under their jurisdiction. The locals should also be the first person to report any water issues.

- AACB training module to enhance stakeholders' leadership roles and facilitate enforcement of policies and laws for a better water governance.[7] AACB training module aspires to enhance stakeholders'

[7] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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leadership roles to facilitate the enforcement of policies and laws for a better water governance including to minimise future disaster from man-made and natural sources.

- Role of local government serves as an important mechanism to further enforce the policies and to facilitate the implementation of relevant strategies and programmes of the federal and state governments, especially on Disaster Risk Reduction (DRR). Incorporate IWRM in the local plan, hence future development will minimise the impact on the river basin.

- Enhance leadership of government officers, especially at local and district levels in moving and realising the IWRM via quadruple helix mode via practices and activities supported by a good flow of scientific data and information. One of the game changers or tipping points for AACB Sub-Sector in making the WST a reality and to be matched by political will via the involvement of parliamentarians of Malaysia via their All-Party Parliamentary Group Malaysia (APPGM).

Enhancing Capacity in data-driven decision-making

- Integrated and a comprehensive data-sharing framework. IWRM should have an integrated and a comprehensive data-sharing framework to accelerate its implementation in Malaysia.[8] Information and data are very crucial in IWRM especially in AACB and PPPs as it can facilitate the stakeholder communication and participation and supporting in decision making.

- Mapping of stakeholders for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information. There should be an effective mapping of stakeholders for Science and Technology (S&T), as well as Social Science and Humanities (SSH) data and information to ease the decision-making processes for IWRM. This will ensure the flow of reliable data and information from relevant agencies to the local government for IWRM.

- Developing and promoting platform for government officials and relevant stakeholders in IWRM. The platform allows any water agencies, water organisations and local communities to share data and information, propose new projects and garner interest amongst potential partners. Facilitating new partners and collective action through collaboration approach.

- Continuous RDIC for National Integrated Data Bank. Continuous RDIC (i.e., research, development, commercialisation and innovation) for National Integrated Data Bank will be the key driver to accelerate the implementation of IWRM. These RDIC will effectively facilitate the real time decision making of stakeholders, especially at local level to promote decision-making processes quickly. In this regard, the stakeholders' mapping, series of dialogue and consultations amongst the federal, state and local level stakeholders will also justify the use of real time data and information coming from RDIC for IWRM.

- Establish IWRM information centre such as Pusat Informasi Sungai at community or Information corner at religious institutions such as surau and churches, local authority offices, tourist information centres, schools and universities.

- To mainstream water resource management as one of the priority research areas in RDIC. It will enhance the roles of researchers and academia from higher education institutions (HEIs) in promoting sustainable water resources management.

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[8] Page 9-18, Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector, Twelfth Malaysia Plan (2021-2025).

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- To establish a database of resource persons (Government, Business & Industry, Academia, Community) in the field of water resource management. The resource persons of IWRM to build the capacity of stakeholders via training.

Strengthening financing capacity

- Adequate funds for non-structural capacity building towards IWRM, comprehensive AACB programme at the PPPs, finance for the pool of water experts to advocate IWRM and training future water leaders using the facilities at the National Training Centres.

- Incentives and award should be provided for the green watershed restoration and nature-based solutions. It is recommended for Malaysian Investment Development Authority (MIDA) to introduce a new category in Green Incentives that is related to water management project. This recommendation aims to encourage more stakeholders to adopt and implement water management project in their respective premises and operations, for example, water reuse and reclamation for non-portable purposes. Any investments in this area to enable business and industry to adopt these practices should be given tax incentives. Besides, Ministry of Finance (MOF) and Inland Revenue Board of Malaysia (LHDN) should also give tax incentives to business and industry that managed to protect and upgrade the condition of the nearest water body for instance the company's tax exemption will be given to business and industry entities, especially to companies for their involvement and contribution in conserving water resources.

- Green incentives and certification for AACB WST Training attendees. Green incentives and certification, and recognition should be given to the SMEs for attending the AACB WST Training programme before water servicing licensing and relicensing.

- Ensure a balanced fiscal federalism, and carrot-and-stick approach to local government. Continuous Federal funding is also very vital for the rehabilitation and restoration of river basin management. AACB training programme will enhance the leadership roles of civil servants for rehabilitation and restoration of river basin management. Federal funding is the main strength to adopt the green economic approaches for IWRM in Malaysia. Therefore, adequate green funding along with training will encourage civil servants for sustainable water resources management while applying green economic approaches such as 'payment for ecosystem services', application of 'polluter pays' principle, and uniform pricing model for water resources, and as such. Moreover, water-based recreation and tourism activities via AACB training programme will also encourage local authorities to promote local level income generation while incorporating the local communities.

Developing sustainable infrastructure cost-effective technology

- Establish IWRM training centres such as Pusat Informasi Sungai and others should have adequate online/ on-site facilities and water experts. The training centre serves as a platform for public participation by coordinating and managing the existing and new public participatory platforms.

The roadmap of AACB WST2040 was proposed based on the recommendations. It was developed based on the gaps identified through the policy review, literature review, qualitative research and stakeholder's engagement. The Road Map is for implementation over a 20-year time frame spanning four Malaysia Plans until 2040. The recommended strategies have been organised following the 5-focus areas under four discrete elements.

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Accelerating adoption of IWRM					**Developing indigenous technology to be on par with international standards**	**Achieving economies of scale**	**Becoming the regional water industry hub**
RM0	**RM26,014,500**	**RM25,821,500**	**RM26,560,000**	**RM26,150,00**	**RM150,420,000**	**RM169,780,000**	**RM209,022,500**
	AACB Training targeted to Quadruple Helix stakeholders to increase people's awareness and instil ownership & values toward water resources						
	Institutionalisation of Public Participatory Platform (PPP)						
	Facilitate the enforcement of policies and laws for better water governance via AACB Training						
	Government to form strategic partnership and establish resource persons directory within their local/regional/international network						
	Integrated and comprehensive data sharing and management						
	Resource persons to publish and disseminate best water management practices through public communication means						
	Adequate funds for non-structural capacity building towards IWRM						
	Give tax incentives, awards and recognitions to water managers that managed to protect and upgrade the condition of their nearest waterbody						
	IWRM training centres and Pusat Informasi Sungai and others should have adequate online/on-site facilities considering the uncertainties						
	Nucleus and complimenting Training Centres at national and state level						
	Impact & Outcomes of the AACB Training Programmes						
People		**Governance**		**Information and RDCI**	**Finance**	**Infrastructure and Technology**	

Figure 8.1: AACB Main Roadmap

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Immediately Implementable Projects for 12th MP

Table 8.1: Tabulated list of Immediately Implementable Projects for 12th MP proposed by AACB Sub-Sector

Programmes	Lead Authority	Proposed Budget
GIS based pollution sources' mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)	KASA/KPKT/MOH	RM16,940,000
Training of SMEs (i.e., small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/training x 154,000 units)	KASA/KPKT/MOH	RM382,500,000
- Trainee (RM) - Trainer (RM) - Events/logistic (RM) - Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/training x 2 pax. X 16 states)	KASA/KPKT/MOH	RM4,481,100,000 RM603,300,000 RM8,203,971,900 RM2,880,000 TOTAL: RM13,291,251,900
Train and retrain teachers on activities that are related to water resource management. Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM. Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	Teacher Training RM10,578,500 (0.5-day training/ RM50 for half day) 12MP: RM1,057,850 Training of Trainers RM40,000 12MP: RM10,000
Professional development programme to familiarise teachers with climate science, active pedagogy and project design. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the teaching module on climate education. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training	Lead Authority KASA Collaborating Partners MOE, ISTIC and Office for Climate Education, UNESCO	(12 hours training) MP: RM350,400 RM10,000
Develop teachers' professional development workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation.	Lead Authority KASA Collaborating Partners MOE, Humid Tropics Centre (HTC-KL)	RM20,000
Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teachers' professional development.	Lead Authority KASA Collaborating Partners MOE, MGTC, ISTIC	RM20,000

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Programmes	Lead Authority	Proposed Budget
	and Office for Climate Education, UNESCO	
Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP)	Lead Authority KASA	RM20,000
Incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers	Lead Authority KASA	RM1,000,000
Develop a water and climate literacies assessment instrument	Lead Authority KASA Collaborating Partners MOE, MOHE	RM20,000
Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	Lead Authority KASA Collaborating Partners MOHE, MOE	(RM100 per school) \RM82,200
Expand digital platforms/tools for teaching and learning Develop simulation-based games, mobile platforms, virtual environments, and augmented reality tools to heighten curiosity and increase learner engagement.	Lead Authority KASA Collaborating Partners MOE, MOHE	RM1,000,000
Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively.	Lead Authority KASA	RM104,108,100 <u>12MP-15MP:</u> Green House: RM92,910,000 Water Distillation Equipment: RM5,085,600 Meteorological Station: RM6,112,500
Establish one-stop educational resources and activities on water and climate change in Digital Educational Learning Initiatives Malaysia (DELIMa) platform.	Lead Authority KASA	RM1,000,000
Train and retrain teachers on activities that are related to water resource management. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teaching module by ASM. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	Teacher Training RM10,578,500 (0.5-day training/ RM50 for half day) RM1,057,850

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Programmes	Lead Authority	Proposed Budget
Compile local and international case studies on the best practices of river/ water management and climate change adaptation.	Lead Authority KASA Collaborating Partners MOE, Humid Tropics Centre (HTC-KL)	RM20,000
Strengthen collaboration and cooperation between TVET and industry, where more sessions or platforms for industry to share their experiences and expectations with the TVET students will be established.	Lead Authority KASA	RM1,000,000
Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	Lead Authority KASA Collaborating Partners MOE	(RM100 per school) RM82,200
Establish a single, searchable, user-friendly online resource for finding water - and climate-related education programmes and resources and funding opportunities as well as to showcase the project-based learning (PBL) activities that were conducted by schools (using a new or enhanced platform).	Lead Authority KASA Collaborating Partners MOE, MOHE, MOSTI	RM1,000,000
To train lecturers on topics and activities that are related to water resource management.	KASA	(1-day training/ RM100 for 1 day) RM250,400
To compile success stories related to water resources management in HEIs (public and private)	KASA	RM20,000
To establish a database of resource persons (from public and private HEIs) in the field of water resource management	KASA	RM50,000
To mainstream water resource management as one of the priority research areas in RDCI.	KASA	RM20 million for each Malaysia Plan (MP)
Researchers' outreach to government agencies.	KASA	RM5 million for each Malaysia Plan (MP)
Researchers' outreach to industry.	KASA	RM5 million for each Malaysia Plan (MP)
Researchers' outreach to community.	KASA	RM5 million for each Malaysia Plan (MP)
To establish an interactive tool that encourage interactive communication between HEIs (public and private) and public	KASA	RM200,000
AACB "Training of Trainers"	KASA/DOE	RM1.2 Million
Water management certificate	KASA /EiMAS	RM1.5 Million
CPD for water management	MOHR	RM480,000
Water resource person network and directory	KASA	RM500,000
Water best management practices communication	KASA	RM500,000

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Programmes	Lead Authority	Proposed Budget
Water incentives	MITI	RM5.0 Million
Company's tax exemption	MOF	RM7.5 Million
Water Sustainability Award	KASA	RM5.0 Million
To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	KASA & state BKSA	RM7,670,000
To develop an Apps Myriverbasin To establish a one-stop website through Apps to share/link data needed for the community to decide on river basin. To adopt an advanced technology in spreading awareness to community's information	KASA & state BKSA	RM1,000,000
To establish an information corner at the religious and community centre.	KASA & state BKSA	RM40,000 (RM100 per centres)
Notice board by the river	KASA/JPS	RM 200,000
To establish a formal platform/state IWRM Training Centre. To reduce red-tapes when dealing with complains from community.	KASA & state BKSA	Consolidated at the Focus Area of People
To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	KASA & state BKSA	Will be consolidated with the local plans/ IRBM plans

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Table 8.2: AACB WST2040 strategies for 12th MP

Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Training module to enhance leadership roles of civil servants in order to facilitate the enforcement of policies and laws for a better water governance. (Government Cluster)	- Trainee (RM) - Trainer (RM) - Events/logistic (RM) - Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/ training x 2 pax. X 16 states)	KASA/KPKT/MOH	Targeted government officers	100%	RM4,481,100,000 RM603,300,000 RM8,203,971,900 RM2,880,000 TOTAL: RM13,291,251,900
	National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum.	KASA/JPA	Targeted Number of PTD Trained	PTD (40 pax X 6 training/year x RM2,500)	RM14,400,000
To ensure flow of reliable data and information from relevant agencies to the local govt. for IWRM. (Government Cluster)	GIS based pollution sources' mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)	KASA/KPKT/ MOH	# of Pollution Mapping for 189 River Basins	95 main river basins (50%) mapped	RM16,940,000
Adequate funds for non-structural capacity building towards IWRM. (Government Cluster)	Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/ training x 154,000 units)	KASA/KPKT/ MOH	# of SMEs trained	1552 SMEs	RM382,500,000
Reiterate importance of rivers as water resources for human and the environment (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM.	KASA	The WST2040 should cover 50% of total teachers	21,157 teachers	Teachers' Training RM10,578,500 (0.5-day training/RM50 for half day) RM1,057,850
			Train 140 trainers	140 trainers	RM10,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training				
	Professional development program to familiarise teachers with climate science, active pedagogy, and project design. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the teaching module on climate education. IPGM - The training will be implemented in arious approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training	KASA	Train 23,360 teachers	5,840 teachers	(12 hours training) RM350,400
			Train 80 trainers	80 trainers	RM10,000
	Develop teachers' professional development workshop module and pedagogical activities (for formal and non-formal settings) on water sustainability and climate change adaptation.	KASA	The content for the module and pedagogical activities are developed during 12 MP.	The content for the module and pedagogical activities are developed during 12 MP.	RM20,000
	Develop inquiry-based climate change pedagogical resources for formal and non-formal settings, including resources for teachers' professional development.	KASA	The pedagogical resources are developed during 12 MP.	The pedagogical resources are developed during 12 MP.	RM20,000
	Offering courses related to water sustainability and climate change education in Program Ijazah Sarjana Muda Pendidikan (PISMP)	KASA	The courses are developed and offered in 12 MP.	The courses are developed and offered in 12 MP.	RM20,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Incorporate elements of sustainable water resources management into relevant teaching programmes in public TVET institutions and private providers	KASA	Relevant TVET programmes have been revised in 12 MP.	Relevant TVET programmes have been revised in 12 MP.	RM1,000,000
	Develop a water and climate literacies assessment instrument	KASA	The instrument is developed during 12 MP.	The instrument is developed during 12 MP.	RM20,000
	Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	KASA	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	822 schools	(RM100 per school) RM82,200
	Expand digital platforms/tools for teaching and learning Develop simulation-based games, mobile platforms, virtual environments, and augmented reality tools to heighten curiosity and increase learner engagement.	KASA	The online education platforms/tools are developed during 12 MP.	The online education platforms/tools are developed during 12 MP.	RM1,000,000
	Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively. (8is - Infrastructure)	KASA	Involving 2,445 secondary schools	2,445 secondary schools	RM104,108,100 12MP-15MP: Green House: RM92,910,000 Water Distillation Equipment: RM5,085,600 Meteorological Station: RM6,112,500
	Establish one-stop educational resources and activities on water and climate change in Digital Educational Learning Initiatives Malaysia (DELIMa) platform. (8is - Infrastructure)	KASA	All schools can access the educational resources and activities in DELIMa.	The one-stop platform is developed during 12 MP.	RM1,000,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Inculcation of local values in promoting sustainable water resources management (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teaching module by ASM. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training (8is - Interaction, Intellectual Capital)	KASA	The WST2040 should cover 50% of total teachers (423,140) in Malaysia	21,157 teachers	Teacher Training RM10,578,500 (0.5-day training/RM50 for half day) 12MP: RM1,057,850
	Compile local and international case studies on the best practices of river/water management and climate change adaptation. (8is - Integrity, Institution)	KASA	Establish a committee to compile local and international case studies on the best practises of river/water management	The case studies on the best practises of river/water management are compiled during 12 MP.	RM20,000
	Strengthen collaboration and cooperation between TVET and industry, where more sessions or platforms for industry to share their experiences and expectations with the TVET students will be established (8is - Integrity, Institution)	KASA	Sessions or platforms for industry to share their experiences and expectations with the TVET students have been established in 12 MP.	Sessions or platforms for industry to share their experiences and expectations with the TVET students have been established in 12 MP.	RM1,000,000
	Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	KASA	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	822 schools	(RM100 per school) RM82,200

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Establish a single, searchable, user-friendly online resource for finding water- and climate-related education programmes and resources and funding opportunities as well as to showcase the project-based learning (PBL) activities that were conducted by schools (using a new or enhanced platform).	KASA	The online platform is developed/enhanced during 12 MP.	The online platform is developed/enhanced during 12 MP.	RM1,000,000
Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management (Academia Cluster)	To train lecturers on topics and activities that are related to water resource management.	KASA	The WST2040 should cover 50% of the total lecturers (50,085 that includes professor, associate professor and lecturers) in Malaysia	2,504 lecturers	RM2,504,300 (1-day training/RM100 for 1 day) 12MP: RM250,400
	To compile success stories related to water resources management in HEIs (public and private)	KASA	Establish a committee to compile success stories related to water resources management in HEIs (public and private)	The success stories are compiled during 12 MP.	RM20,000
	To establish a database of resource persons (from public and private HEIs) in the field of water resource management	KASA	The database is made available online.	The database is established during 12 MP.	RM50,000
	To mainstream water resource management as one of the priority research areas in RDCI.	KASA	The funding will be provided by Government	10 projects for each Malaysia Plan (MP)	RM20 million for each Malaysia Plan (MP)
	Researchers' outreach to government agencies.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM 5 million for each Malaysia Plan (MP)
	Researchers' outreach to industry.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Researchers' outreach to community.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	To establish an interactive tool that encourage interactive communication between HEIs (public and private) and public	KASA	The interactive tool can be used in different platforms, such as Windows, Mac, Android, iOS, etc.	The interactive tool is established during 12 MP.	RM200,000
Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders (Business & Industry Cluster)	AACB "Training of Trainers"	KASA/DOE	# participant that has been trained	1240 pax	RM1.2 Million
Provide competency certification for business and industry stakeholders who have undergone the training (Business & Industry Cluster)	Water management certificate	KASA (EiMAS)	Giving competency certification for EHS and Sustainability Professionals of business and industry.	Certification mechanism established	RM1.5 Million
Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc) (Business & Industry Cluster)	CPD for water management	Ministry of Human Resource (MOHR)	CPD mechanism established	CPD mechanism established	RM480,000
Government to form strategic partnership with business and industry and establish resource persons directory within their regional network (Business & Industry Cluster)	Water resource persons network and directory	KASA/MITI	A directory of resource persons is available for public access.	A directory of resource persons is available for public access.	RM500,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Resource persons to publish and disseminate water best management practices in business and industry through public communication means (Business & Industry Cluster)	Water best management practices communication	KASA	# of event/meeting that been hold	50 events	RM500,000
Introduce new category in Green Incentives that is related to water management project (Business & Industry Cluster)	Water incentives	MIDA	# of company or industries that receive water incentives.	50 companies	RM7.5 million
Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody (Business & Industry Cluster)	Company's tax exemption	MOF	# of company or industries that receive water incentives	50	RM5 million
Give awards and recognitions to business and industry that succeed in applying best management practices in their respective premises (Business & Industry Cluster)	Water Sustainability Award	KASA	# of event that been hold	50 events	RM7.5 million
Increasing community's awareness and instil ownership towards rivers and other water sources in their river basin. (Community Cluster)	To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	KASA & state BKSA	# of Advocators	1,500 pax	RM7,670,000
	To develop an Apps Myriverbasin To establish a one-stop website through an Apps to share/link data needed for the community to decide on river basin	KASA & state BKSA	# of Advocators	Developed during 12 MP.	RM1,000,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	To adopt an advanced technology in spreading awareness to community information.				
	To establish an information corner at the religious and community centre.	KASA & state BKSA	# of information corner	400 information corners	RM40,000 (RM100 per centres)
	Notice board by the river		# of Notice board	400 rivers	RM200,000
Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction. (Community Cluster)	To establish a formal platform/state IWRM Training Centre. To reduce red-tapes when dealing with complains from community.	KASA & state BKSA	Establish a formal platform/state IWRM Training Centre.	Training facility, and trainer's fee	Consolidated at the Focus Area of People
	To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	KASA & state BKSA	Established task force/ working committee	The federal government should set certain targets and provide sufficient funding for the state and local government	Will be consolidated with the local plans/ IRBM plans
National Communication Plan					
To enhance the communication, education, and public awareness through Strategic National Communication Plan	To expand the implementation of public outreach programme and participation	KASA	Established National Communication Plan	By 2022, the National Communication Plan must be launched	RM1,000,000
Public Participatory Platform (PPPs)					
To establish and encourage the water related PPPs	National Water Resource Grant	KASA	Number of Grant Applied	Community-based organisations (CBOs) such as Resident Associations, JKKK and Rukun Tetangga; Non-profit organisations, learning institutions and special interest groups who has interest in the management of their river basins and academia.	RM4,000,000 (RM1,000,000 per year)

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Table 8.3: AACB WST2040 strategies for 13th MP

Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Training module to enhance leadership roles of civil servants in order to facilitate the enforcement of policies and laws for a better water governance. (Government Cluster)	- Trainee (RM) - Trainer (RM) - Events/logistic (RM) - Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/training x 2 pax. X 16 states)	KASA/KPKT/ MOH	Targeted government officer	33.33% from 1.7 million	RM1,426,418,333 RM190,189,111 RM25,884,73,802 RM4,800,000 TOTAL: RM4,209,881,246
	- National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum	KASA/JPA	Targeted Number of PTD Trained	PTD (40 pax X 6 training / year x RM2,500)	RM18,000,000
To ensure good flow of reliable data and information from relevant agencies to the local govt. for IWRM. (Government Cluster)	- Digitalisation of WST2040 AACB training module (Lump sum) - GIS based pollution sources' mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)	KASA/KPKT/ MOH	100% Digitalisation # of Pollution Mapping for 189 River Basins	100% Digitalization 94 main river basins (50%) mapped	RM50,000 RM15,400,000
Adequate funds for non-structural capacity building towards IWRM. (Government Cluster)	Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/training x 154,000 units)	KASA/KPKT/ MOH	# of SMEs trained	154,000 SMEs	RM65,000,000
IWRM training centres such as Pusat Informasi Sungai and other should have adequate online/on-site facilities considering the uncertainties. (Government Cluster)	- Developing a portal and digital AACB content such as video clips, posters, infographics and podcasts for 154 Local Authorities (LS RM750,000) - Establishment of WST2040 AACB Water Hub in 13 States and 3 F.T. for public participatory and effective decision-making processes of IWRM. (Lump sum RM 15,000 x 16 units)	KASA/KPKT/ MOH	Portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management developed	Portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management developed. (Update)	RM750,000 RM60,000 RM681,500,000 RM900,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	- 400 Training Events in every year (1 training = 4 days) (Lump Sum) (25 training/year/state (i.e. 16 states)) - 1 Coordinator for IWRM Training with an FASc based at LESTARI, UKM (RM15,000/month) - 5 Assistants to facilitate IWRM Training based at LESTARI, UKM (RM5,000/month) - Honorarium for Resource Person (RP) to facilitate IWRM Training (Lump sum RM10,000/pax/training x 1,567 pax)		WST2040 AACB Water Hub developed	8 water Hub in Central and north region operated	RM1,500,000 RM2,800,000
Reiterate importance of rivers as water resources for human and the environment (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM. Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	The WST2040 should cover 50% of total teachers	42,314 teachers	(0.5-day training/RM50 for half day) RM2,115,700
			Train 140 trainers	140 trainers	RM10,000
	Professional development program to familiarise teachers with climate science, active pedagogy, and project design. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the teaching module on climate education.	KASA	Train 23,360 teachers	5,840 teachers	(12 hours training) RM350,400
			Train 80 trainers	80 trainers	RM10,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training				
	Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	KASA	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	1,644 schools	(RM100 per school) RM164,400
	Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively.	KASA	Involving 2,445 secondary schools	2,445 secondary schools	RM104,108,100 12MP-15MP: Green House: RM92,910,000 Water Distillation Equipment: RM5,085,600 Meteorological Station: RM6,112,500
Inculcation of local values in promoting sustainable water resources management (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teaching module by ASM. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia	42,314 teachers	(0.5-day training/RM50 for half day) RM2,115,700

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	KASA MOE	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	1,644 schools	(RM100 per school) RM164,400
Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management (Academia Cluster)	To train lecturers on topics and activities that are related to water resource management.	KASA	The WST2040 should cover 50% of the total lecturers (50,085 that includes professor, associate professor, and lecturers) in Malaysia	5,008 lecturers	(1-day training/RM100 for 1 day) RM500,800
	To mainstream water resource management as one of the priority research areas in RDCI.	KASA	The funding will be provided by Government	10 projects for each Malaysia Plan (MP)	RM20 million for each Malaysia Plan (MP)
	Researchers' outreach to government agencies.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	Researchers' outreach to industry.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	Researchers' outreach to community.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders (Business & Industry Cluster)	AACB "Training of Trainers"	KASA/DOE	# Participant that has been trained	1,240 pax	RM1201436.00
Provide competency certification for business and industry stakeholders who have undergone the training (Business & Industry Cluster)	Water management certificate	KASA (EiMAS)	Giving competency certification for EHS and Sustainability Professionals of business and industry.	Certification mechanism established	RM1.5 million

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc) (Business & Industry Cluster)	CPD for water management	Ministry of Human Resource (MOHR)	CPD mechanism established	CPD mechanism established	RM480,000
Government to form strategic partnership with business and industry and establish resource persons directory within their regional network (Business & Industry Cluster)	Water resource persons network and directory	KASA/MITI	A directory of resource persons is available for public access.	A directory of resource persons is available for public access.	RM500,000
Resource persons to publish and disseminate water best management practices in business and industry through public communication means (Business & Industry Cluster)	Water best management practices communication	KASA	# of event/meeting that been hold	50 events	RM500,000
Introduce new category in Green Incentives that is related to water management project (Business & Industry Cluster)	Water incentives	MIDA	# of company or industries that receive water incentives.	50 companies	RM7.5 million
Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody (Business & Industry Cluster)	Company's tax exemption	MOF	# of company or industries that receive water incentives	50	RM5 million
Give awards and recognitions to business and industry that succeed in applying best management practices in their premises (Business & Industry Cluster)	Water Sustainability Award	KASA	# of event that been hold	50 events	RM7.5 million

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin. (Community Cluster)	To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	KASA & state BKSA	# of Advocators	3000 pax	RM15,300,000
	To develop an Apps Myriverbasin To establish a one-stop website through an Apps to share/link data needed for the community to decide on river basin To adopt an advanced technology in spreading awareness to community' nformation	KASA & state BKSA	# of Advocators	3000 pax	RM15,300,000
	To establish an information corner at the religious and community centre	KASA & state BKSA	# of information corner	1,000 centres	RM100,000 (RM100 per centres)
	Notice board by the river		# of Notice board	1,000 rivers	RM500,000 (RM500 per river)
Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction. (Community Cluster)	To establish a formal platform/ state IWRM Training Centre. To reduce red-tapes when dealing with complains from community.	KASA & state BKSA	Establish a formal platform/state IWRM Training Centre.	Training facility, and trainer's fee	(Consolidated at the Focus Area of People)
	To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	KASA & state BKSA	Established task force/ working committee	The federal government should set certain targets and provide sufficient funding for the state and local government	Will be consolidated with the local plans/ IRBM plans
Public Participatory Platform (PPPs)					
To establish and encourage the water related PPPs	National Water Resource Grant	KASA	Number of Grant Applied	Community-based organisations (CBOs) such as Resident Associations, JKKK and Rukun Tetangga; Non-profit organisations, learning institutions and special interest groups who has interest in the management of their river basins and academia.	RM5,000,000 (RM1,000,000 per year)

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Table 8.4: AACB WST2040 strategies for 14th MP

Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Training module to enhance leadership roles of civil servants to facilitate the enforcement of policies and laws for a better water governance. (Government Cluster)	- Trainee (RM) - Trainer (RM) - Events/logistic (RM) - Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/training x 2 pax. X 16 states)	KASA/KPKT/ MOH	Targeted government officers	33.33% from 1.7 million	RM1,426,418,333 RM190,189,111 RM25,884,73,802 RM4,800,000 TOTAL: RM4,209,881,246
	- National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum	KASA/JPA	Targeted Number of PTD Trained	PTD (40 pax X 6 training /year x RM2,500)	RM18,000,000
To ensure a good flow of reliable data and information from relevant agencies to the local govt. for IWRM. (Government Cluster)	- Digitalisation of WST2040 AACB training module (Lump sum) - GIS based pollution sources' mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)	KASA/KPKT/ MOH	Update & Review	Update & Review	RM50,000 RM15,400,000
Adequate funds for non-structural capacity building towards IWRM. (Government Cluster)	Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/training x 154,000 units)	KASA/KPKT/ MOH	# of SMEs trained	2600 SMEs	RM65,000,000
IWRM training centres such as Pusat Informasi Sungai and other should have adequate online/on-site facilities considering the uncertainties. (Government Cluster)	- Developing a portal and digital AACB content such as video clips, posters, infographics, and podcasts for 154 Local Authorities (LS RM750,000) - Establishment of WST2040 AACB Water Hub in 13 States and 3 F.T. for public participatory and effective decision-making processes of IWRM. (Lump sum RM15,000 x 16 units)	KASA/KPKT/ MOH	Portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management developed	Portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management developed. (Update)	RM750,000 RM60,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	- 400 Training Events in every year (1 training = 4 days) (Lump Sum) (25 training/year/state (i.e. 16 states)) - 1 Coordinator for IWRM Training with an FASc based at LESTARI, UKM (RM15,000/month) - 5 Assistants to facilitate IWRM Training based at LESTARI, UKM (RM5,000/month) - Honorarium for Resource Person (RP) to facilitate IWRM Training (Lump sum RM10,000/pax/training x 1,567 pax)		WST2040 AACB Water Hub developed	12 water Hub in Central, north, Sabah & Sarawak region operated	RM681,500,000 RM900,000 RM1,500,000 RM2,800,000
Reiterate importance of rivers as water resources for human and the environment (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM. Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	The WST2040 should cover 50% of the total teachers	63,471 teachers	(0.5-day training/RM50 for half day) RM3,173,550
			Train 140 trainers	140 trainers	RM 10,000
	Professional development program to familiarise teachers with climate science, active pedagogy and project design. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the teaching module on climate education.	KASA	Train 23,360 teachers	5,840 teachers	(12 hours training) RM350,400
			Train 80 trainers	80 trainers	RM10,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training				
	Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	KASA	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	2,466 schools	(RM100 per school) RM246,600
	Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively.	KASA	Involving 2,445 secondary schools	2,445 secondary schools	RM104,108,100 12MP-15MP: Green House: RM92,910,000 Water Distillation Equipment: RM5,085,600 Meteorological Station: RM6,112,500
Strategy 2: Inculcation of local values in promoting sustainable water resources management (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teaching module by ASM. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	The WST2040 should cover 50% of the total teachers (423,140) in Malaysia	63,471 teachers	(0.5-day training/RM50 for half day) RM3,173,550

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	KASA	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	2,466 schools	(RM100 per school) RM246,600
Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management (Academia Cluster)	To train lecturers on topics and activities that are related to water resource management.	KASA	The WST2040 should cover 50% of the total lecturers (50,085 that includes professor, associate professor, and lecturers) in Malaysia	7,513 lecturers	(1-day training/RM100 for 1 day) 14MP: RM751,300
	To mainstream water resource management as one of the priority research areas in RDCI.	KASA	The funding will be provided by Government	10 projects for each Malaysia Plan (MP)	RM20 million for each Malaysia Plan (MP)
	Researchers' outreach to government agencies.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	Researchers' outreach to industry.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	Researchers' outreach to community.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders (Business & Industry Cluster)	AACB "Training of Trainers"	KASA/DOE	# participant that has been trained	1,240 pax	RM1,201,436.00
Provide competency certification for business and industry stakeholders who have undergone the training (Business & Industry Cluster)	Water management certificate	KASA (EiMAS)	Giving competency certification for EHS and Sustainability Professionals of business and industry.	Certification mechanism established	RM1.5 million

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc) (Business & Industry Cluster)	CPD for water management	Ministry of Human Resource (MOHR)	CPD mechanism established	CPD mechanism established	RM480,000
Government to form strategic partnership with business and industry and establish resource persons directory within their regional network (Business & Industry Cluster)	Water resource persons network and directory	KASA/MITI	A directory of resource persons is available for public access.	A directory of resource persons is available for public access.	RM500,000
Resource persons to publish and disseminate water best management practices in business and industry through public communication means (Business & Industry Cluster)	Water best management practices communication	KASA	# of event/meeting that been hold	50 events	RM500,000
Introduce new category in Green Incentives that is related to water management project (Business & Industry Cluster)	Water incentives	MIDA	# of company or industries that receive water incentives.	50 companies	RM7.5 million
Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody (Business & Industry Cluster)	Company's tax exemption	MOF	# of company or industries that receive water incentives	50 companies	RM5 million
Give awards and recognitions to business and industry that succeed in applying best management practices in their premises (Business & Industry Cluster)	Water Sustainability Award	KASA	# of event that been hold	50 events	RM7.5 million

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin. (Community Cluster)	To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	KASA & state BKSA	# of Advocators	6000 pax	RM30.6 Million
	To develop an Apps Myriverbasin To establish a one-stop website through an Apps to share/link data needed for the community to decide on river basin To adopt an advanced technology in spreading awareness to community information.	KASA & state BKSA	# of Advocators	6000 pax	RM30.6 Million
	To establish an information corner at the religious and community centre.	KASA & state BKSA	# of information corner	1,500 centres	RM150,000 (RM100 per centres)
	Notice board by the river		# of Notice board	1,500 rivers	RM750,000 (RM500 per river)
Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction. (Community Cluster)	To establish a formal platform/state IWRM Training Centre. To reduce red-tapes when dealing with complains from community.	KASA & state BKSA	Establish a formal platform/state IWRM Training Centre.	Training facility, and trainer's fee	Consolidated at the Focus Area of People
	To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	KASA & state BKSA	Established task force/ working committee	The federal government should set certain targets and provide sufficient funding for the state and local government	Will be consolidated with the local plans/ IRBM plans
Public Participatory Platform (PPPs)					
To establish and encourage the water related PPPs	National Water Resource Grant	KASA	Number of Grant Applied	Community-based organisations (CBOs) such as Resident Associations, JKKK and Rukun Tetangga; Non-profit organisations, learning institutions and special interest groups who has interest in the management of their river basins and academia.	RM5,000,000 (RM1,000,000 per year)

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Table 8.5: AACB WST2040 strategies for 15th MP

Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Training module to enhance leadership roles of civil servants in order to facilitate the enforcement of policies and laws for better water governance. (Government Cluster)	- Trainee (RM) - Trainer (RM) - Events/logistic (RM) - Extra hours at 13 States & 3 F.T. if required by AACB (RM30,000/training x 2 pax. X 16 states)	KASA/KPKT/ MOH	Targeted government officer	33.33% from 1.7 million	RM1,426,418,333 RM190,189,111 RM25,884,73,802 RM4,800,000 TOTAL: RM4,209,881,246
	- National Institute of Public Administration (INTAN) to incorporate the government and academic training modules in their curriculum.	KASA/JPA	Targeted Number of PTD Trained	PTD (40 pax X 6 training/year x RM2,500)	RM18,000,000
To ensure a good flow of reliable data and information from relevant agencies to the local govt. for IWRM. (Government Cluster)	- Digitalisation of WST2040 AACB training module (Lump sum) - GIS based pollution sources' mapping of 154 local authorities along with available river information (Lump Sum RM50,000/Local Authority)	KASA/KPKT/ MOH	Update & Review	Update & Review	RM50,000 RM15,400,000
Adequate funds for non-structural capacity building towards IWRM. (Government Cluster)	Training of SMEs (i.e. small and medium enterprises, (154,000 pax)) for licensing and relicensing from 154 Local Authorities (2023 and onwards) (Lump sum RM2,500/pax/training x 154,000 units)	KASA/KPKT/ MOH	# of SMEs trained	# of SMEs trained	RM65,000,000
IWRM training centres such as Pusat Informasi Sungai and other should have adequate online/on-site facilities considering the uncertainties. (Government Cluster)	- Developing a portal and digital AACB content such as video clips, posters, infographics, and podcasts for 154 Local Authorities (LS RM750,000) - Establishment of WST2040 AACB Water Hub in 13 States and 3 F.T. for public participatory and effective decision-making processes of IWRM. (Lump sum RM15,000 x 16 units)	KASA/KPKT/ MOH	Portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management developed	Portal and digital AACB content such as video clips, posters, infographics, and podcasts for 189 river basin's management developed	RM750,000 RM60,000 RM681,500,000 RM1,500,000

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	- 400 Training Events in every year (1 training = 4 days) (Lump Sum) (25 training/year/state (i.e. 16 states))1 Coordinator for IWRM Training with an FASc based at LESTARI, UKM (RM15,000/month) - 5 Assistants to facilitate IWRM Training based at LESTARI, UKM (RM5,000/month) - Honorarium for Resource Persons (RP) to facilitate IWRM Training (Lump sum RM10,000/pax/training x 1,567 pax)		WST2040 AACB Water Hub developed	16 WST2040 AACB Water Hub developed	RM7,000,000
Reiterate importance of rivers as water resources for human and the environment (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. Bahagian Pendidikan Guru (BPG) - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teachers' professional development module on water sustainability by ASM. Institut Pendidikan Guru Malaysia (IPGM) - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	The WST2040 should cover 50% of total teachers	84,628 teachers	(0.5-day training/RM50 for half day) RM4,231,400
			Train 140 trainers	140 trainers	RM10,000
	Professional development program to familiarise teachers with climate science, active pedagogy, and project design. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the teaching module on climate education.	KASA	Train 23,360 teachers	5,840 teachers	RM350,400
			Train 80 trainers	80 trainers	RM10,000

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continued

Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid: i. Training of Trainers ii. Teachers' Training				
	Establish a whole-school approach to promote water and climate literacies through formal and non-formal settings and quadruple helix model	KASA	The WST2040 should cover 50% of the total schools (16,440) in Malaysia	3,288 schools	RM328,800
	Educate present and future generations about climate change by providing tools to help students learn science and geography more fun and effectively.	KASA	Involving 2,445 secondary schools	2,445 secondary schools	RM104,108,100 12MP-15MP: Green House: RM92,910,000 Water Distillation Equipment: RM5,085,600 Meteorological Station: RM6,112,500
Inculcation of local values in promoting sustainable water resources management (Academia Cluster)	Train and retrain teachers on activities that are related to water resource management. BPG - Planning and conducting structured teachers' professional development for in-service teachers based on the guidebook or teaching module by ASM. IPGM - The training will be implemented in various approaches of training such as face to face, online, and hybrid. i. Training of Trainers ii. Teachers' Training	KASA	The WST2040 should cover 50% of total teachers (423,140) in Malaysia	84,628 teachers	(0.5-day training/RM50 for half day) RM4,231,400

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
	Federal and state/local agencies arrange education programmes that involve learners use open government data related to water and climate change in data-driven decision making.	KASA	The WST2040 should cover 50% of total schools (16,440) in Malaysia	3,288 schools	RM328,800
Enhance the roles of researchers from higher education institutions (HEIs) in promoting sustainable water resources management (Academia Cluster)	To train lecturers on topics and activities that are related to water resource management.	KASA	The WST2040 should cover 50% of total lecturers (50,085 that includes professor, associate professor and lecturers) in Malaysia	10,018 lecturers	RM1,001,800
	To mainstream water resource management as one of the priority research areas in RDCI.	KASA	The funding will be provided by Government	10 projects for each Malaysia Plan (MP)	RM20 million for each Malaysia Plan (MP)
	Researchers' outreach to government agencies.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	Researchers' outreach to industry.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
	Researchers' outreach to community.	KASA	The funding will be provided by Government	Government will provide yearly operation fund to researchers.	RM5 million for each Malaysia Plan (MP)
Holistic "Training of Trainers" capacity building for business and industry cluster stakeholders (Business & Industry Cluster)	AACB "Training of Trainers"	KASA/DOE	# Participant that has been trained	1,240 pax	RM1,201,436.00
Provide competency certification for business and industry stakeholders who have undergone the training (Business & Industry Cluster)	Water management certificate certification for EHS and Sustainability Professionals of business and industry.	KASA (EiMAS)	Giving competency	Certification mechanism established	RM1.5 million

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continued

Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Provide Continuing Professional Development (CPD) point to those Professional Practitioners (i.e. BEM, MBOT, MGBC, PAM, etc) (Business & Industry Cluster)	CPD for water management	Ministry of Human Resource (MOHR)	CPD mechanism established	CPD mechanism established	RM480,000
Government to form strategic partnership with business and industry and establish resource persons directory within their regional network (Business & Industry Cluster)	Water resource persons network and directory	KASA/MITI	A directory of resource persons is available for public access.	A directory of resource persons is available for public access.	RM500,000
Resource persons to publish and disseminate water best management practices in business and industry through public communication means (Business & Industry Cluster)	Water best management practices communication	KASA	# of event/meeting that been hold	50 events	RM500,000
Introduce new category in Green Incentivesthat is related to water management project (Business & Industry Cluster)	Water incentives	MIDA	# of company or industries that receive water incentives.	50 companies	RM7.5 million
Give tax incentives to business and industry that managed to protect and upgrade the condition of their nearest waterbody (Business & Industry Cluster)	Company's tax exemption	MOF	# of company or industries that receive water incentives	50	RM5 million
Give awards and recognitions to business and industry that succeed in applying best management practices in their premises (Business & Industry Cluster)	Water Sustainability Award	KASA	# of event that been hold	50 events	RM7.5 million

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Main Strategies	Programmes	Lead Authority	Proposed KPI	Targets	Proposed Budget
Increasing community awareness and instil ownership towards rivers and other water sources in their respective river basin. (Community Cluster)	To converge the issues and needs of ENGOs and community leaders in increasing IWRM awareness.	KASA & state BKSA	# of Advocators	12000 pax	RM61.2 million
	To develop an Apps Myriverbasin To establish a one-stop website through an Apps to share/link data needed for the community to decide on river basin To adopt an advanced technology in spreading awareness to community information.	KASA & state BKSA	# of Advocators	12000 pax	RM61.2 million
	To establish an information corner at the religious and community centre.	KASA & state BKSA	# of information corner	2,000 centres	RM200,000 (RM100 per centres)
	Notice board by the river	KASA & state BKSA	# of Notice board	2,000 rivers	RM1,000,000 (RM500 per river)
Empower community to effectively participate in IRBM to adapt to climate change and disaster risk reduction. (Community Cluster)	To establish a formal platform/state IWRM Training Centre. To reduce red-tapes when dealing with complains from community.	KASA & state BKSA	Establish a formal platform/state IWRM Training Centre.	Training facility, and trainer's fee	(Consolidated at the Focus Area of People)
	To incorporate IWRM/IRBM in the structure or local plan, to minimise development impact on the river basin and reduce budget for disaster management.	KASA & state BKSA	Established task force/ working committee	The federal government should set certain targets targets and provide sufficient funding for the state and local government	Will be consolidated with the local plans/IRBM plans
Public Participatory Platform (PPPs)					
To establish and encourage the water related PPPs	National Water Resource Grant	KASA	Number of Grant Applied	Community-based organisations (CBOs) such as Resident Associations, JKKK and Rukun Tetangga; Non-profit organisations, learning institutions and special interest groups who has interest in the management of their river basins and academia.	RM5,000,000 (RM1,000,000 per year)

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