Global Water Partnership Southeast Asia

Water, Climate and Development Programme (WACDEP)

CASE STUDY: RIVER RANGER in MALAYSIA "Empowering the Civic Society for a Clean River and a Flood Resilient Community. A Case study of RIVER Ranger in Malaysia"

www.gwpsea.org

Global Water Partnership Southeast Asia (GWP-SEA) Regional Secretariat. Directorate General of Water Resources Building, 8th Fl. Room: 808. Ministry of Public Works Republic of Indonesia. Jakarta 12330.
Phone: +62 21 739 6792 , E-mail : secretariat@gwpsea.org

CASE STUDY: RIVER RANGER in MALAYSIA

Title: Empowering the Civic Society for a Clean River and a Flood Resilient Community. A Case study of RIVER Ranger in Malaysia

1. Background

The global Water, Climate and Development Programme (WACDEP) was developed to promote water security as a key element of sustainable development of countries and regions and to contribute to climate change resilience for economic growth and human security. Key elements of the WACDEP suite of programs and projects include the development of local capacity and institutional development, development of tools, and generating evidence to inform decision making on climate-resilient development through demonstration projects and knowledge of products.

In the Southeast Asia region (ASEAN), the first phase of WACDEP was formally introduced in 2014-2016. It aimed to integrate water security and climate resilience in development planning processes, build climate resilience, and support ASEAN countries to adapt to a new climate regime through increased investments in water security. The expected result of the project was to improve governance for sustainable development and management of water resources at all levels.

Following the completion of the first phase and to demonstrate GWP's commitment to the Paris Agreement, the recently implemented WACDEP 2017-2019 was designed to focus on the issues of Floods and Drought Management. This can be done by anchoring the issues in the country's National Adaptation Plans (NAPs) that will contribute to achieving the Nationally Determined Contributions (NDCs) target and eventually the Sustainable Development Goals (SDGs) 6.

As one of the GWP-SEA country members, Malaysia Water Partnership has been committed to supporting the implementation of WACDEP. Several activities were carried out to support the country's commitment to addressing the issues of floods and climate change resilience. One of the activities during the first phase of WACDEP is 'Community flood-proofing and adaptation for climate resilience'. This was done through the demonstration project.

2. Introduction

Since the early civilization in Malaysia, rivers have become the center of economic and cultural development. This is evident since almost all major towns in Malaysia are located alongside a river. In support of this argument, archeological findings have given a strong confirmation that more than 30,000 years ago the earliest settlement was beside a riverbank of the upper Perak River in a small kampung in Luat, Perak. As time went by, rivers in Malaysia have been providing services for socio-economic development and livelihood as well as great support through ecosystem services for humans and animals. Currently, there are some 150 river systems in Peninsular Malaysia and a further 50 river systems in Sabah and Sarawak that provide support for the national development and environmental-related services.

Following its independence in 1957, Malaysia has been driven by economic development targets, the continuation of rapid population growth that led to land development, urbanization, and industrialization has resulted in environmental problems and degradation. The problems associated

with the river in Malaysia, among others are water shortage, flooding, river and water pollution, river sedimentation, and squatters.

To prevent further deterioration of the river environment, the government of Malaysia has taken many initiatives. First and the most important is establishing strict water laws. There are about 40 Federal laws related to land and water[1]. Besides, there are 3 or 4 enactments in each state. Summing all the related laws, Malaysia has more than 100 laws that are associated with water or river. Second, is by established a River Basin Authority (RBA) that can integrate and coordinate activities within a river basin. An example of the effort to make the realization of this matter has been taken by the State of Selangor by establishing "Lembaga Urus Air Selangor (LUAS) or the Selangor Waters Management Authority". The LUAS is responsible for planning and regulating land and water development activities in an integrated manner at the river basin level. The provision of master plans or manuals and guidelines is another effort that has been carried out. Other initiatives are taken through curative cleaning and preventive measures. In addition, the government supports all initiatives with financial instruments especially intending to enable cost recovery. Last but not least, the effort was also taken through introducing the Integrated River Basin Management (IRBM) and encouraging public participation in the entire project/program cycle.

This case study will cover the initiative that has been taken by the government's counterpart, the Global Environment Centre (GEC) in collaboration with Malaysia Water Partnership (MyWP) in applying the Integrated River Basin Management (IRBM) that focus at the community level. An IRBM project emphasis on the community involvement was then initiated at a pilot level located in Selangor, Klantan, and Sabah in 2004. Having a fruitful result and lesson learned through 4 years of implementation, the program called RIVER Ranger then established as a means to simplify the IRBM concept which later on being implemented in the whole of Malaysia.

RIVER Ranger as it explicitly described by its name is a program that focuses on water and river management through the Civic Science approach. The program consists of several elements, among others: protection and conservation, restoration and rehabilitation, education and awareness, river monitoring, capacity building, and program/project planning and implementation. The program has been produced several training modules. Under the WACDEP project, a training module emphasis on Community-Based Flood Preparedness and Mitigation was then established. With further collaboration with MyWP and Department of Irrigation and Drainage (DID) Malaysia, the training of trainers on community engagement in all the States and Federal territories in Malaysia was conducted.

3. Description of the Problem

As one of the developing countries in the Southeast Asia region, environmental degradation has become a threat to ensuring sustainable development in Malaysia. For more than a decade, water security has become the major issues and the impact will likely become more severe due to the adverse effects of climate change. The first identifiable problem is the occurrence of floods due to uncontrolled developments, ineffective policy measures to mitigate the floods and monsoon phenomenon. Secondly, the number of the polluted river is increasing gradually. The water quality has decreased due to anthropogenic activities such as the discharge of untreated or partially treated wastewater to the river. This does not comply with the affluence of industrial, agriculture, and domestic standard. Lastly, deforestation, which is partly caused due to land clearing for agriculture

[1] Taken from https://www.water.gov.my/index.php/pages/view/708 dated 25 May 2018

and illegal logging has made the biodiversity and ecosystem more vulnerable to losses thus, aggravating environmental problems.

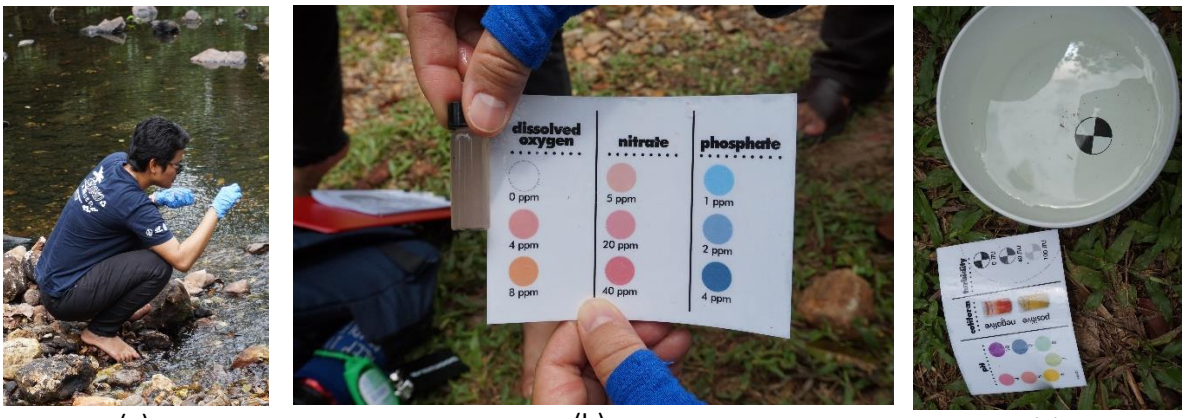
Environmental issues in Malaysia is manifested mostly by human-induced activities. Unsustainable urbanization has pressurized the river basin manifesting negative consequences such as increased pollution and solid waste, illegal dumping, and settlement, and encroachment of the river reserve. Besides, the river depth has gradually reduced due to siltation from several construction activities thus, also reducing river water quality. Lack of public awareness and poor waste management has also caused the river and drainage channel to be filled with litters. The heavily polluted river has disrupted the clean water source. This eventually will not be sufficient to meet the demand for domestic, industrial, and commercial purposes. Effective solutions to the problems are urgently needed.

Over the years, alternative solutions were developed and successfully implemented. The most important part of this solution is improving public awareness on these issues that are encountered by both nature and the built environment. *Civic science* approach for environmental education is used to raise awareness and empower society or target specific groups in dealing with the issues. The method was prepared such that the community can monitor or audit the river using physical, chemical, as well as biological in combination with social, civil, and traditional science. Also, the government, private sector, and CSOs are actively engaged in public dialogues, community engagement and outreach, as well as CSR activities to develop a sense of belonging and improved public capacity in terms of knowledge and skills. Lastly, the RIVER Ranger Programme was able to advance partnerships between various stakeholders who have concerns regarding river-related issues.

It was during the year 2014-2015 when one of the worst floods in decades hit the country. Eleven states affected by this catastrophe are Johor, Kedah, Kelantan, Negeri Sembilan, Pahang, Perak, Perlis, Sabah, Sarawak, Selangor, and Terengganu (mostly in the East Coast and Northern region of Peninsular Malaysia). More than 200.000 peoples were affected, and 24 casualties were reported during the disaster. In terms of financial loss, more than RM 560 million of property and monetary damage were recorded. It was during this period the government of Malaysia realized the importance of community empowerment so that they can be more self-prepared to face another flood event in the future. The communities are expected to ably carry-out mitigation measures such as flood hazard maps, as well as hands-on safety training and demonstration to survive a flood.

In response to the situation, the Global Environment Centre (GEC) in cooperation with Malaysia Water Partnership (MyWP) initiated community-based flood preparedness activities. Under the River Care Programme, the RIVER Ranger program was initiated and developed. The RIVER Ranger Programme acts as an educational effort in dealing with environmental problems, specifically related to water and river management by engaging local communities. The program aimed to improved the community's awareness of the issues and empowered them in mitigation measures. Fieldwork was also established for the children at school to become a 'River Scientist' who seriously wants to learn and contribute to the water and river-related issues in Malaysia by taking them to the nearest river and provide related forms of training. The training consists of how to take a water sample, measure water quality using a simple method such as bio-indicators and ensuring they know their '*River Address'*.

Figure 1 A technique to take a water sample and to measure water quality under the RIVER Ranger program and its related activities



(a) (b) (c)

(a) taking a water sample into the tube; (b) checking the water dissolved oxygen according to the color indicator as stated on the card; (c) checking water turbidity according to the color as stated on the card

4. Action Taken

This section will discuss the ascent of the two programs under the umbrella of the River Care program. These two programs are the SMART Ranger and RIVER Ranger. A big portion of attention is given to the RIVER Ranger program as it will become the focus of this case study. Subsequently, the discussion then is followed by how the Community-Based Flood Preparedness and Mitigation project under the GWP-SEA's WACDEP was introduced into the RIVER Ranger program. The last part of this section is discussed in the establishment of the National RIVER Care Fund (NRCF). This initiative is considered to play a substantial role in the continuation of the effort on river protection and community empowerment.

4.1 The Ascent of the SMART Ranger and RIVER Ranger Under the River Care Programme

River related environmental problem has been the major concern of the stakeholders in Malaysia, among others are the Federal Government such as the Department of Irrigation and Drainage (DID) under the Ministry of Natural Resources and Environment, local governments, and non-profit organization such as the Global Environment Centre (GEC) who later played a big role in development and implementation of river-related programs.

The GEC was established in 1998 to work on environmental issues of global importance covered by the river as the main focus among 2 others (peatlands, forest, and biodiversity). Under the River Care Programme, the Integrated River Basin Management (IRBM) approach was adopted and as the guiding principle, community involvement is compulsory. In the early 2000s, community participation was a totally new approach. The opportunity arose in 2004 when GEC secured funding from Danish International Development Assistance (DANIDA) to carry out a pilot project of Community Participation in River Management in partnership with DID Malaysia with support from the Economic Planning Unit of Prime Ministers Department of Malaysia.

These sites located in Selangor (Pencala River, and a lake system in Kelana Jaya) and 2 sites with rural settings were in Klantan and Sabah. After 4 years of implementation, the IRBM was only able to partly

resolve the problem. This was due to its highly technical nature and multiple interpretations which inhibited the idea to reach the grass-root level. Then, the decision was taken to establish the River Care program to simplify the IRBM so that the public can easily rationalize and understand.

After 4 years of implementation, the project showed positive results, notably, that community successfully played an important role in sustainable river management. Nonetheless, one of the key lessons learned was that the community was having problems understanding the IRBM concept due to its highly technical nature and multiple interpretations. Sometime the idea simply couldn't reach the grass-root level, thus, GEC at that time decided to simplify the IRBM for local contact by establishing the River Care program with the tag line of ***'River Care We Care'***. The main program of this concept was RIVER Ranger for those who are concerned and want to participate in water and river protection and monitoring and SMART Ranger which focused on solid waste management.

4.1.1 SMART Ranger

The concept of SMART Ranger came about during the three-year implementation of the Kelana Jaya Lakes Rehabilitation Programme with support from DANIDA in 2004. At that time, the 3 working groups consisted of pollution reduction, rehabilitation, and education. This came together to undertake a task with the community on improving environmental quality. 'SMART' is an abbreviation for '*Start Managing All Resources Today*'.

The concept of SMART Ranger was introduced in September 2014 where the pilot was taken up by Sekolah Kebangsaan Sri Kelana (the national primary school), Petaling Jaya, Selangor. The very first SMART Ranger group was formed on 26 September 2014 consisting of 4 teachers and 17 students. A weekly collection of recyclables was performed every Friday along with other activities such as discussions, demonstrations, and competition to raise awareness about the environment to their fellow students and teachers.

Following the promising outcomes of the pilot project, a School Environment Education Programme was established where one of the main activities was Environment Education Camps. On the camps, the students were taught more about environmental management that specifically focused on the issue of solid waste management as it was seen as one of the major issues in Malaysia. Subsequently, the GEC later developed a proper education program for school children and their teachers on solid waste management and named it SMART Ranger Programme.

The SMART Ranger program was also developed to support the implementation of Solid Waste and Public Cleansing Management act at the local level and to meet its objectives. These objectives, among others, are: 1) create and enhance public awareness on managing resources; 2) a way for them to contribute to environmental well-being; 3) to teach them the importance of reducing their waste and recycling; 4) to initiate a systematic and scheduled recycling program; 5) to help generate revenue for classroom activities; and 6) to set-up a recycling collection center, where possible.

To become a SMART Ranger, students and teachers need to follow protocols to become eligible and learn about solid waste management that came under several modules. The protocols involve 4 steps process such as selection process, support group, training, and action. Besides, during the training session, the trainees compel to learn from 4 modules, among others: solid waste and environment; integrated waste management, hands-on-activities (the art of recycling); and the next step (how to initiate a zero-waste system).

4.1.2 RIVER Ranger

In parallel with SMART Ranger, the RIVER Ranger program was developed and implemented since 2004 which focuses on water and river management through the Civic Science approach. The program

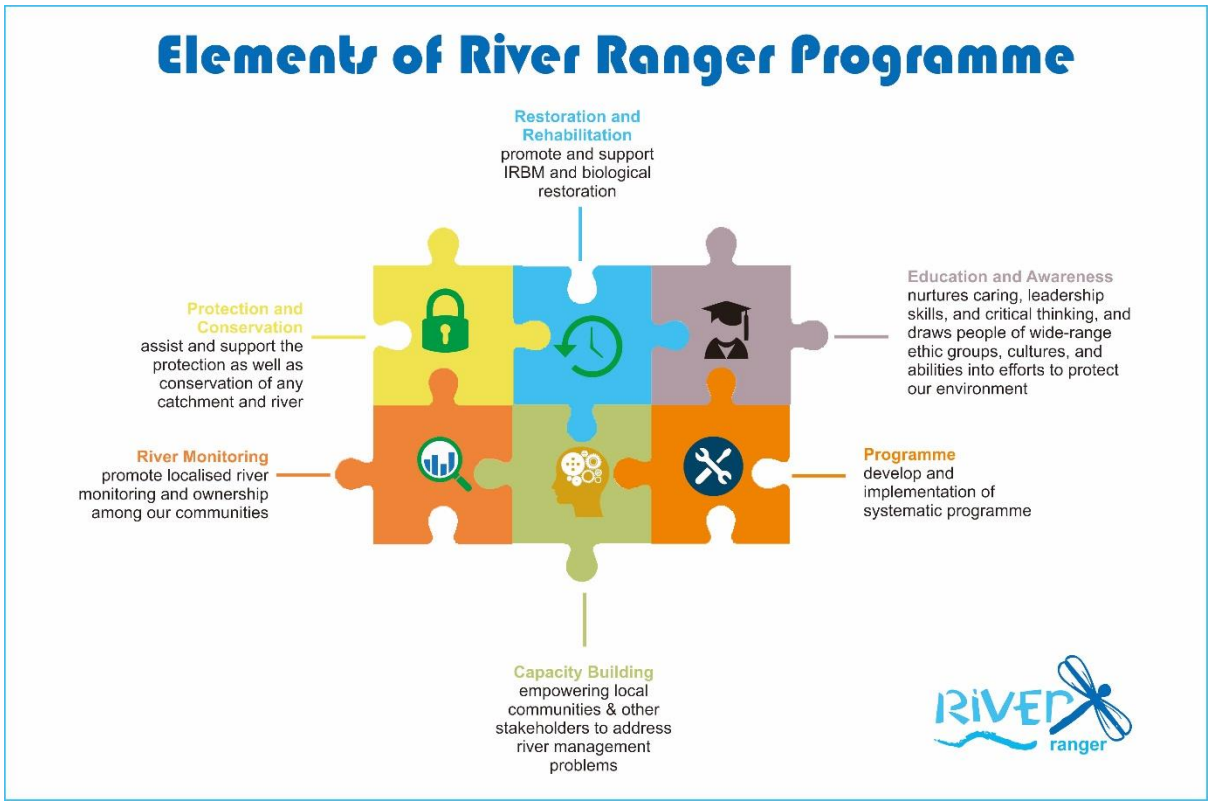
also adopted a civic science approach (**see Figure 2**) and consists of several elements among others: protection and conservation, restoration and rehabilitation, education and awareness, river monitoring, capacity building, and program (**see Figure 3**). Six Training of Trainers (ToT) on community engagement was carried out for the DID officers as a pilot project in all the States and Federal territories in Malaysia.

Figure 2 Components of Civic Science Approach

The first RIVER Ranger pilot project was implemented at SMK Teloi Kanan Secondary School, Kedah in 2004. With favorable outcomes, the pilot was then followed by the establishment of the RIVER Ranger program or similar by other stakeholders/agencies in Malaysia.

Based on the community concerns during the implementation of the pilot project, a lesson learned was identified and crucial for the continuity of the program in solving the environmental problem on the river. First, GEC believed that the communities' concerns were correct. Secondly, the communities didn't know what they were facing and what they were blaming as they didn't understand the situation. This situation was related to their understanding of the issues of: '***river address***', the problem, and regulation whether it is Federal or State matter and which agency is responsible for dealing with the problem. As a result, a decision to educate the community on the issue came up in the first place in hopes to develop the communities' sense of belonging and responsibility to their river.

Figure 3 Element of RIVER Ranger Programme



Empowering the community is the main objective of the RIVER ranger program. The program has 6 key features on how empowerment will be conducted as discussed further in **Figure 4**. In addition, 4 stages are necessary to be completed to become an eligible RIVER Ranger. The communities or students should go through a selection process and then followed by a support group. During the support group, core members and their respective working committees need to be established to ensure the program gets full participation and support from everyone. The next process involving the training of which the participants will receive a certificate of recognition as a RIVER Ranger if they can complete the whole training modules (please refer to **Figure 5**). Most importantly, the candidates should know about their '***river address***'. River address consists of 3 important information, such as 1) what is the nearest river/ drain to the house, school, working place; 2) where the drinking/tap water comes from or where the location of water intake/treatment plant and how the water channel / transferred into your premises; and 3) sanitation part. After consumed, then where the wastewater goes or where the location of the wastewater treatment plant is, whether they are using a septic tank or centralize. The final process of becoming an eligible RIVER Ranger is 'action', of which they required to carry out river monitoring in their respective area and undertake several substantial activities. These activities among others are: conduct river mapping activities; develop a schedule for river observation and monitoring; smart water management initiative project; and be encouraged to be part of something 'BIG' such as World River Day. The water quality data and key findings will be shared through the website: www.riverranger.my

Figure 4 Key Features of RIVER Ranger Programme

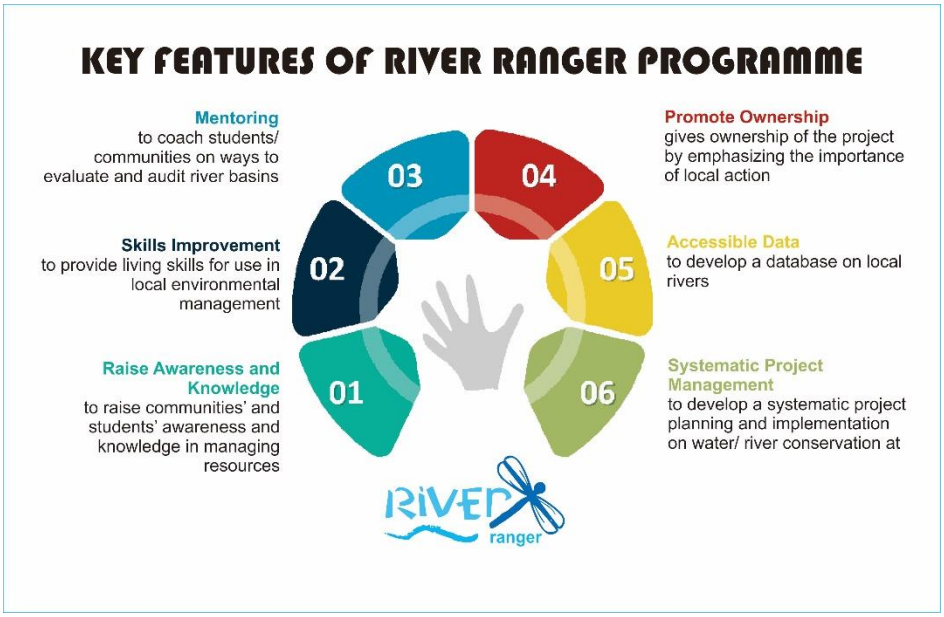
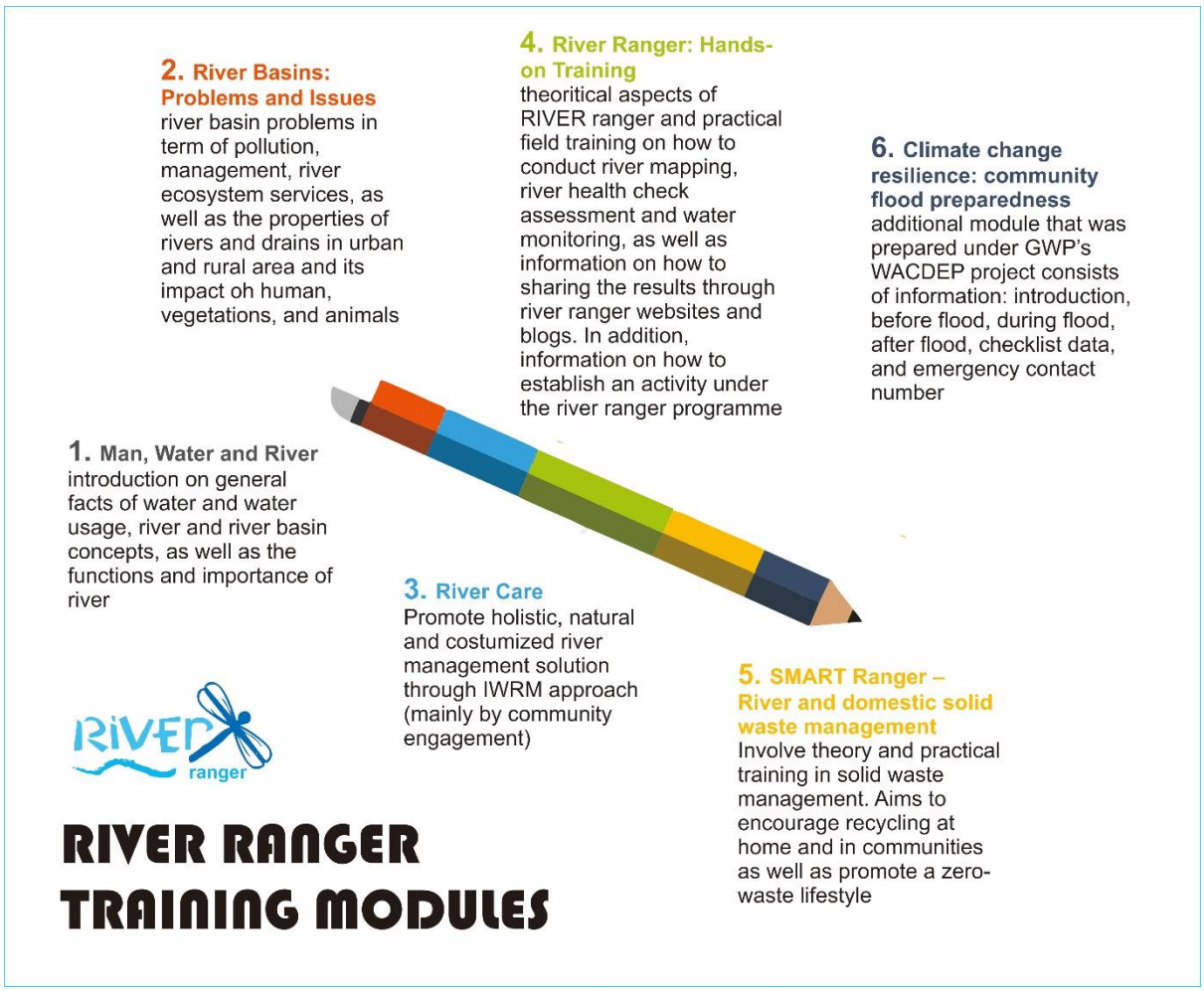


Figure 5 RIVER Ranger Modules



An illustration of how each RIVER Ranger group carries out their activity at the community level is discussed in **Figure 6**. These sites, all locations are under the River of Life[2] Public Outreach Programme (ROLPOP) project phase 1.

Figure 6 Example of RIVER Ranger Activities under the ROLPOP Project Phase 1

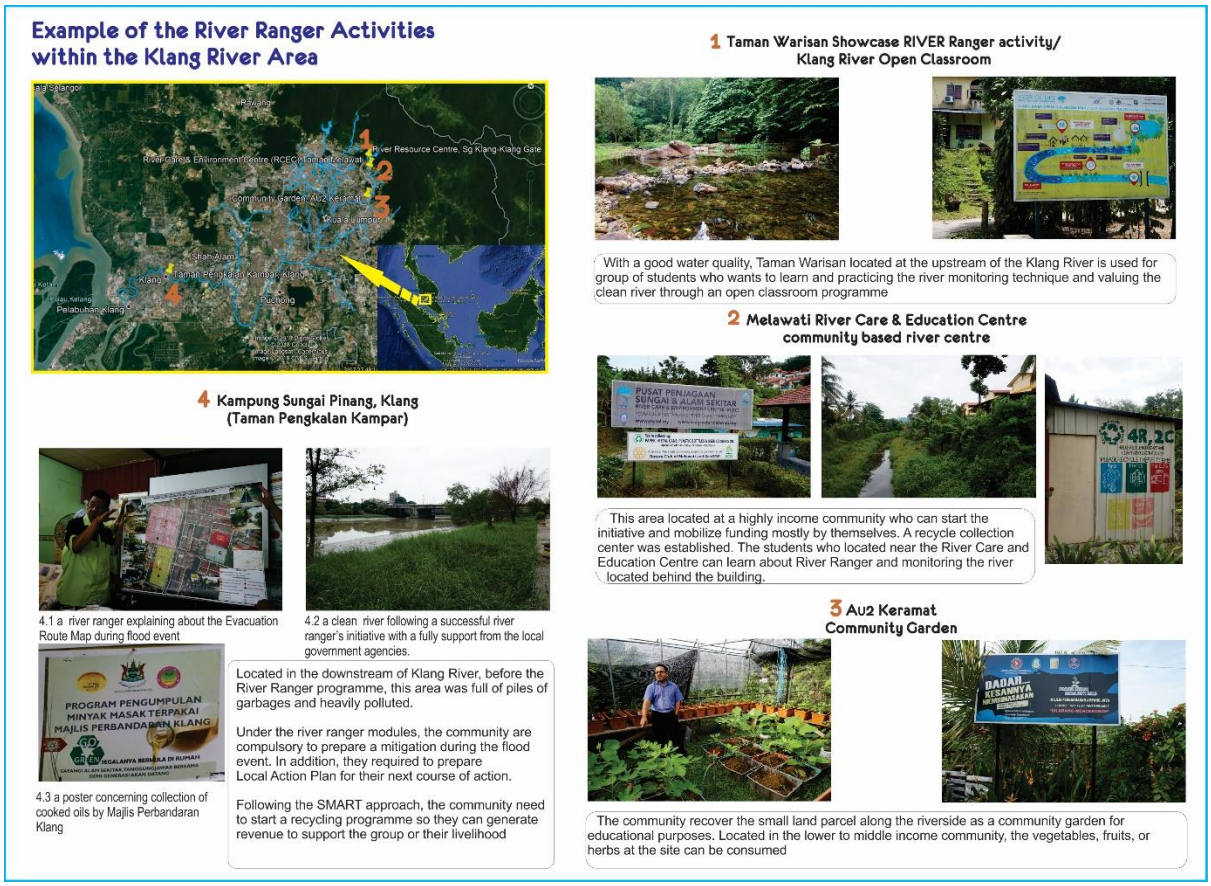


Figure 7 An information covers the location of the RoL project and where the information board located on the street (this sign located near to the Kuala Lumpur Central Market)

[2] River of Life (RoL) is a RM 4.4 billion government initiative project that aims to make a world class waterfront city that launched officially in August 2017 consists of 3 major components, namely: river cleaning, river master planning and beautification, and river development, which located at Klang River and Gombak River and another six tributaries, all located within the Greater KL (Kuala Lumpur) and Klang Valley region

At Present, the River Care program consists of 4 main activities, such as river conservation (restoration and rehabilitation), environmental activities (including river monitoring and pollution reduction), environmental education, and community outreach. RIVER Ranger is part of the GEC's environmental activities along with SMART Ranger, ISLAND Ranger, PARK Ranger, and DrH2O.

4.2 RIVER Ranger and Community-Based Flood Preparedness and Mitigation Activity Under the GWP-SEA's WACDEP Project

The first phase of the Water and Climate Development Programme (WACDEP) in the Southeast Asia region was implemented from 2014-2016 by all the country's members in the region including Malaysia. The GWP-SEA WACDEP Project was aimed to mobilize activities that will contribute to the achievement of a higher level of water security and climate resilience in ASEAN countries through the promotion of Integrated Water Resources Management (IWRM) in collaboration with key strategies aimed to foster governance of water resources at all levels. Following the fruitful result from the implementation of the RIVER Ranger program, the Malaysia Water Partnership (MyWP) requested collaboration from the GEC to provide an additional module within the well-established RIVER Ranger modules. This urgent decision was taken as the worst flood in decades hit the country during that period. This collaboration was successfully implemented under the Community floodproofing and adaptation for the climate-resilience project.

Community floodproofing and adaptation for climate-resilience project was developed to improve stakeholders and the community's access to knowledge on the issues of water security and climate resilience. The community was provided with opportunities to learn information on both structural and non-structural measures as well as individual and community level mitigation that have been implemented in flood mitigation. Furthermore, selected communities were empowered in flood preparedness through ***'FLOOD Ranger'*** training (Subset of RIVER Ranger program) to play their role as a *town-watching*[3]. The RIVER rangers were provided with skills and knowledge to deal with flood risks and able to prevent and manage flood problems at the local level.

The 'FLOOD Ranger' program set several objectives to empower the community for dealing with flood management. The first objective is to increase public awareness and knowledge in managing resources. Secondly, it will provide the participants with a set of skills that can be put into practice. Another purpose of the RIVER Ranger is to teach participants so they can proficiently evaluate and audit river basins as well as be capable of developing a database on local rivers. Finally, the program intends to motivate the participants to initiate water or river conservation projects within their community, at school, or in an organization. Everyone who attended the full training program is worthy of the title RIVER Ranger and will obtain a membership certificate.

The key outcome of Flood Ranger is the community flood hazard map. The reason behind this is because they are the most prone to flood they can play an important role in the river basin management. This can be done by empowering the community through training and exposure the holistic river basin management. This helps them to be prepared for floods and can manage to keep the river clean in their area.

The training program for communities is aligned with the government's disaster management policy lead by the National Disaster Management Agency (NADMA)[4] specifically concerning the 'Guidelines on flood preparedness: before, during and after flooding'. The NADMA is responsible for coordinating

[3] **Town watching** basically the Ranger play their role in monitoring their respective river /water body in the neighborhood. If necessary, they can make report of their finding to the respective agency

[4] NADMA has taken over the disaster management in Malaysia from the National Security Council (NSC) in 2015

national disaster management and accountable for the establishment of national disaster management and its implementation at all levels.

Following the training program are several knowledge products that have been developed through the years of implementation of the RIVER Ranger Programme. Four training modules were developed during the initial phase and later on two more modules (shown with an asterisk character). These modules are: Module 1: Man, Water, and River; Module 2: River Basins: Problems and Issues; Module 3: River Care; Module 4: RIVER RANGER: Hands-on Training; Module 5: SMART Ranger – River and domestic solid waste management (*); Module 6 – Climate change resilience: community flood preparedness (*). In addition to that, a tool kit such as a river report card (**please check the Annex 1 for more details**), biological monitoring, and other kits such as grab bag and kit 72H were also developed.

Figure 8 Kit 72H and Grab Bag

a) Kit 72H

b) Grab Bag

The kit 72H and grab bag designed as a dry bag that contains highly important items. The kit 72H contains survival items during the 72 hours after the flood which is a critical time before the flood reaches the settlements. The **kit 72H** dry bag should contain several items as follows: 1 portable water container; 3 packs of various cooked rice and ready to serve; at least one of meat on the list (e.g. chicken rendang, cooked chicken with carrot, chicken curry with potatoes, etc.); 3 packs of biscuits; 3 sets or more of the following item on the list (sugar, tea/coffee, baby milk, vitamin B complex); 1 fruit can; 3 granola bars; 5 packs of dried fruit/raisin; 1 pack of 100plus; 1 piece of utility knife; 1set of fork and spoon; 1 small pot; 1 portable cup; 1 piece of rope; and 1 set of flashlight and batteries. The quantity of the product will be based on family size. The **Grab bag,** on the other hand, should contain several items such as important documents; emergency kit and medicines; hygiene kits; personal kit; and other important items.

The program's fruitful results have been recognized by the Department of Drainage and Irrigation of Malaysia and have adopted the program's training modules and toolkits. The initiative was also followed by other agencies and related stakeholders who later had utilized the modules and methods as part of their program or activities.

At least two more stakeholders adopted the community empowerment approach that is part of the RIVER Ranger program's key features (please check **Figure 4** for more details). Firstly, Selangor Waters Management Authority (LUAS) with the QUA-QUA program. The Qua-Qua Programme employs three

methods: physical observation, chemical testing, and using biological indicators to analyze and monitor the quality of water sources and rivers. Secondly, PUNCAK NIAGA HOLDINGS BERHAD under Selangor State Government) initiated a '*Kelab Briged Penyelamat Sungai*' (River Rescue Brigade Programme) as a Corporate Social Responsibility activity (CSR) that aims to increase awareness in the issue of environmental protection and conservation of natural resources (the river) among the school children group.

4.3 From RIVER Ranger to the Establishment of the National River Care Fund

With more than 10 years of partnership between GEC, DID and other related stakeholders (especially from the Federal government), the future of river management in Malaysia is now supported by both the community and government initiative. The community initiative now has been supported through the National River Care Fund (NRCF).

Following the successful implementation of the RIVER Ranger program in the whole country and to get more community initiatives in hands and to seize the opportunity from crowdfunding, the GEC initiated the establishment of the National RIVER Care Fund by the end of 2015. This fund was set-up and aims for the establishment and encouragement of civil society who are capable to contribute and demonstrate the best management practices of RIVER Care and to support the community-based water and river care program in Malaysia. The support can be given to the local community, community-based organizations/ non-profit organizations, and learning institution that wants to pursue their river conservation initiatives.

The National River Care Fund is available for those who are eligible for project design that meets the necessary categories. The fund must be mobilized for environmental purposes and only eligible for: a) community-based organization (CBOs) such as Resident associations, JKKK and Rukun Tetangga, and special interest groups who work on the river basins management; b) must be used for projects located in Malaysia only. The grant can be seen as a startup or seed funding, available from RM. 2.000 up to RM. 5.000 per project (around ± EUR. 400 – EUR. 1.000). The project design should meet the categories as follows:

- Raising awareness and community participation activities
- Riverine biodiversity conservation/ habitat creation/ river conservation and protection
- River audit or pollution monitoring
- River restoration or rehabilitation
- Sustainable livelihood focusing on river conservation
- Promote best practices for pollution reduction
- RIVER Ranger/ SMART Ranger/ Island Ranger/ Flood Ranger/ DRH2O programme

To ensure independence, a team of advisory members was selected to assess the incoming proposal. The team consists of experts from different backgrounds such as government agency, MyWP, university, GEC, and non-profit organizations. The selection process is made every April-June and October-December during each calendar year. The project should take place 15 days after signing the contract and must be implemented within the first 3 months prior to receiving the first installment. For each grantee that has failed to deliver the project within the first 3 months, they are required to refund the grant money to GEC.

Box 1. A government perspective on community engagement in a River Basin Management

Dato' Hanapi Mohamad Noor
Chairperson, Malaysian Country Water Partnership and former Director for Water Resources Management and Hydrology Division, Department of Irrigation and Drainage Malaysia

To ensure success in river protection. community engagement is very important which shall stress on ownership, beneficiary use, and sustainable effort. Focus to be given on educating the community on the importance of rivers in their surroundings such as rivers as a source of clean water to support life and other recreational activities. The community also must understand that rivers too can pose serious hazards such as health problems and flooding problems if nobody cares about rivers and rivers are left neglected.

The Malaysian Government has included Collaborative Governance as one of the principles of the National Water Resources Policy (NWRP). Furthermore, the Policy Statement of the NWRP has stressed that the effective management of water resources is to be enabled by a mechanism of a shared partnership involving all stakeholders. Since 97% of water usage in Malaysia comes from rivers, therefore conservation and protection of rivers will be given utmost priority. The Government knows well that the authorities alone would not be able to manage rivers without the support of all stakeholders which include the community.

5. Outcomes

Several fruitful outcomes have been achieved from more than 10 years of implementation of the RIVER Ranger and its subset programs. Some of them have made the establishment of important activities. This can be identified through several indicators that will be discussed as follows.

- **Improvement of river water quality and its ecosystem**
  With a regular monitoring activity and through advocacy, the river water quality nowadays is cleaner than before the initiation of the program. Not only the water quality but also solid waste management along the river area. Another way to encourage the community to improve the river in their area is through competition between groups of communities, recognition especially through media, reward, and award.

Figure 9 A Much Cleaner Riverside Situation at Taman Pengkalan – Kampar After the Involvement of River Ranger Group in Monitoring the River

- **Increased the number of government agencies and corporations who adopted the community empowerment approach and implemented their project/program**
  Apart from the DID, a few stakeholders in Malaysia have also adopted the community empowerment approach on their program/project, among others are: 1) PUNCAK NIAGA HOLDINGS BERHAD initiated a CSR activity called '*Kelab Briged Penyelamat Sungai*' (River Rescue Brigade Programme) activity to increase awareness in the issue of environmental protection and conservation of natural resources (the river) among the school children group; 2) Selangor Waters Management Authority (LUAS) with QUA-QUA program involves students and the society in monitoring the quality of water within their community; 3) HSBC Bank Malaysia carried out a 'Water Conservation and Environmental Programme for Schools' in Malaysia between 2014-2017 and Citizens Science Leadership Programme.

- **The number of schools engaged in RIVER Ranger school program increased significantly**
  Following the successful implementation of the RIVER Ranger pilot project at SMK Teloi Kanan Secondary School, Kedah in 2004, currently, most schools in Malaysia have a River Ranger Team/ Nature Club.

- **The number of student's knowledge and skills has improved through the Klang River open classroom**
  Following the successful implementation of the RIVER Ranger program in the Taman Warisan area that is located in the upstream of the Klang River, the river area now has become a location for a group of students who want to learn and practice the river monitoring technique and evaluating the clean river. The area was established in 2011 and known as Open Class Room, River Resources Centre (RRC).

Figure 10 Information Board Indicated the Location and details of the Open Class Room at Taman Warisan

- **Improvement of the community resiliency on the flood-related disaster**
  Communities have been empowered and capable of preparedness for flood disasters through Flood Hazarded 'Town-watching' as well as management of water resources, emergency plan, and preparedness for flood using Grab Bag and Kit 72H.

- **Communities are capable to develop Local Action Plan annually and are getting support from the local government through counseling and annual fund allocation**
  Several local governments such as in Klang-Selangor annually support the RIVER ranger group by allocated funds on their budget. Furthermore, several agencies are also involved in giving guidance or mentoring over the years.

- **Establishment of recycling material supply chain or recycled product center**
  Following the adoption of the SMART (*Start Managing All Resources Today)* Ranger program, the RIVER ranger groups were trained in solid waste management, specifically to start a recycling program so they can generate revenue to support the group or their livelihood. Several recycling collection centers were established where possible which contribute to the recycling material supply chain. The material that is recycled among others is used cooking oil, papers, leftover packaging from glass or metal material, etc.

- **Establishment of Sustainable financing to demonstrate the best river management practices through the National River Care Fund**
  By the end of 2015, the National River Care Fund was established and design for those who want to mobilize their project design that aimed for river conservation initiatives. The grant can be seen as a startup or seed funding, available from RM. 2.000 up to RM. 5.000 per project (around ± EUR. 400 – EUR. 1.000) and be assessed and selected by the team of advisory 2 times a year.
  Until cycle 4, 29 grants were given to CBOs and educational institutions (student association); 6 training was conducted as part of the empowerment process and more than three hundred thousand RM in total were channeled.
  A million RM was predetermined as the target of the trust fund to be collected for the coming years.

6. Lesson Learned and Replicability

The reason behind the success of the RIVER Ranger program is mainly due to the communities able to play their role as the 'eyes and ears' to audit and monitor the rivers. Firstly, with prolonged exposure to the holistic river basin management, the RIVER Rangers can monitor and share the data with relevant agencies through the RIVER Ranger website (*www.riverranger.my*). Secondly, the certified RIVER Rangers are obligated for educating fellow friends and neighbors. The educating task was taken through the promotion of ownership and improving the responsibility to manage the issues on water resource management, water conservation, and sustainable water usage and wastewater management. By doing so, hopefully, the communities can monitor and assist in conserving river basins in their respective area and together develop a Local Action Plan for their next course of action. Finally, the RIVER Ranger program also managed to create a young river scientist among the students. The rationale behind organizing young river scientists is to improve youth awareness on the importance of the river and river monitoring as early as possible.

As the awareness on protecting the river gradually arises among the communities, many stakeholders including the government through the Department of Irrigation and Drainage Malaysia acknowledge the impact of the program. Therefore, presently all the states have RIVER Ranger team and have been organizing river empowerment activities yearly as the program is known for its holistic approach for river management. As a result of regular water quality monitoring, the river gets cleaner since the

community act as eyes and ears for the enforcement agencies. The local communities will be alerted if any suspicious activities are discovered in their area. Any illegal activities such as waste dumping into the river will be directly reported. Besides, a sense of ownership was created with more communities, businesses, and corporates engaged in community outreach, adoption, and sustainable water/river programs. More river stretches are adopted by various groups (target groups).

Box 2. NGO perspective on community engagement in a River Basin Management

Dr. K. Kalithasan
Manager, River Care Programme at the Global Environment Centre

Community engagement is a pivotal element in river basin management. Community engagement has been proved to produce a positive outcome that leads to lasting and sustainable collaboration in managing a river basin. But, to effectively engage them is no simple task.

As an NGO that advocates on river conservation, building trust with the community and becoming their partner; consistently illuminating them on their role as the key stakeholder and beneficiary; empowering them through systematic capacity building and awareness-raising programs that will reconnect them to rivers often lead to them taking ownership of their river basin.

Building a dynamic platform (for instance linking community initiative with existing government projects and any other related activities by other stakeholders) between the community and relevant parties to work together is also important to ensure the active participation of all stakeholders. Decision or policymakers have to also recognize values that can be derived from community engagement in shaping sustainable river basin management and eliminate perception "communities are incompetence to manage rivers in a sustainable manner" among government officials through awareness.

The water quality monitoring and other activities can be carried out with financial support from government agencies as well as from private sectors and international donors. This was done through the corporate social responsibility and state/local government budget.

Despite gaining positive outcomes, the RIVER Ranger program still encountered several implementation issues. First, the local authorities still find it difficult to solve the problem in areas outside their jurisdiction. Secondly, the report from communities sometimes is not followed by action by the enforcement agencies. Third, different levels of awareness and knowledge of environmental management among stakeholders are still unclear. Lastly, the existence of gaps in communication between the stakeholders, the presence of conflict between river users, and within upstream and downstream communities affect the program.

With several positive impacts, the future and sustainability of the RIVER Ranger program seem to be bright although few implementation issues are yet to be resolved. The existence of a platform for government agencies and local communities will ensure significant changes in managing the river pollution as long as all parties work together. Besides, the provision of skills and empowerment for not only public but also relevant agencies will enable utilization of the available funding and technical channel within stakeholders including government, university, service provider, and others to sustain localized initiatives. One the one hand, the local government can improve their role to support the implementation of the program, involvement of local communities/ targeted groups, program

visibility, as well as support and coordinate the program between the agencies. On the other hand, the government's key partners can provide more support for technical and logistic arrangements.

Several lessons learned can be taken from the RIVER Ranger program implementation in Malaysia. Firstly, the community outreach program or engaging community in a program is far more effective if carried out using a bottom-up as opposed to the top-down approach. GEC plays a role in ensuring community engagement from the grass-root level, whereas the DID and several government agencies mainly play their role in supporting community involvement through the governments' program. These two approaches are proven to be successfully implemented under the initial RIVER Ranger training modules and also with the additional flood-related module.

In addition, as part of a non-structural approach in dealing with floods, community-based flood preparedness is essential since it allows the community to better deal with uncertainties from climate-related disasters. Different tools and methods are available which will greatly assist the community in minimizing the impacts of floods.

By using appropriate tools or methods such as community-based flood mapping, utilizing grab bags and 72H Kit will greatly assist the community in minimizing the impact of the flood.

Following support from MyWP under the flag 'Community floodproofing and adaptation for climate-resilience project', the RIVER Ranger program has made some favorable outcomes as it can be assessed by several indicators. First, the information is regularly shared by each RIVER Ranger group through websites, instant messages, and other communication channels. Secondly, the communities are competent to carry out preparedness and develop localized flood hazard maps and able to distribute this information and lesson learned to their neighborhoods. Thirdly, the community can effectively use the available methods or tools such as 72H kit, grab bags, potable water tubes, and others as part of preparedness and mitigation. Fourthly, the National Disaster Management Agency (NADMA) has acknowledged this program and agreed to incorporate the module with its community outreach program. Lastly, currently, MyWP and GEC are working closely with the government agency, NADMA to empower more communities.

The technical and financial support from MyWP has been effective in promoting the RIVER Ranger initiative into a successful program. With the availability of seed-funding and proper planning, the GEC will be able to carry out training of trainers, follow-up actions, and co-financing by government agencies and private sectors.

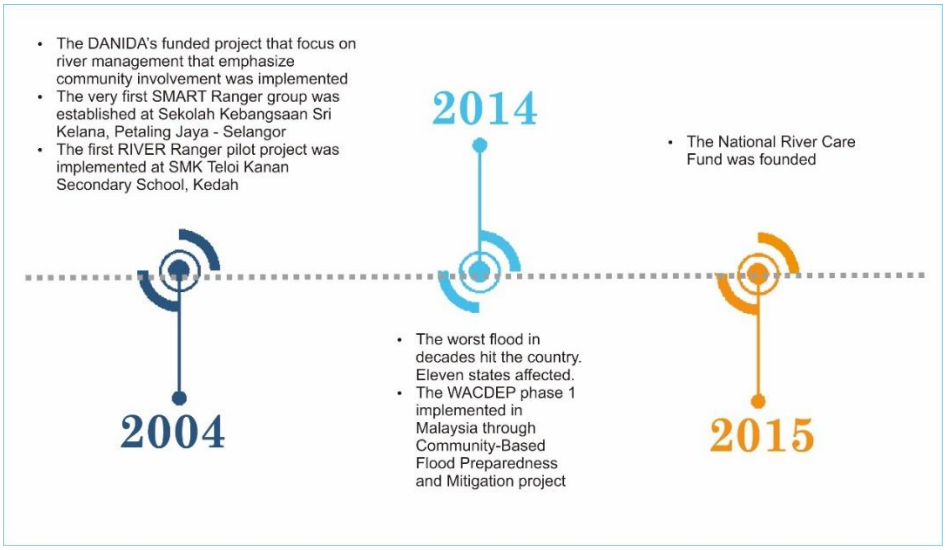
During several years of implementation, the program has encountered some challenges. Lack of commitment and participation from relevant stakeholders still can be observed. Limited support from media hindering the fruitful progress that can be used for scaling up the program. The media supposedly play their role in making people aware of environmental issues and taking actions to protect the environment especially on the flood; spread and disseminate information to a wider audience; as well as able to attract more potential partners, stakeholders, members, donors, fundraisers, or helpers. Like in any country, the media is usually allocated more time on political issues whilst the environmental topic commonly is not the prime agenda for media coverage. Furthermore, another setback arose from the information that was not delivered effectively to the local communities.

Based on the above discussion, the RIVER Ranger program has an excellent possibility to be replicated by another country. One of the factors is because the program adopted an Integrated Water Resources Management (IWRM) approach. Several IWRM's principles were identified such as: holistic management, multiple perspectives, participatory approach, women involvement, and multiple uses.

Secondly, the program was successfully implemented mainly due to involvement from various stakeholders which will promote a sense of ownership.

Lastly, the fruitful result of the program does not happen within a year or two years of project implementation. The success is achieved with a regular activity carried out every year, a deep understanding from both the government and other related stakeholders about the importance of community empowerment that was established through a bottom-up and top-down approach, and the community who put a concern to their rivers and willing to take action.

Figure 11 Important Milestones



7. Conclusion

The case study was prepared for identifying the best practice in delivering the IWRM concept at the grass-root level. As part of the network in the Southeast Asia region, MyWP supports the implementation of the WACDEP program in the country through 'Community floodproofing and adaptation for climate-resilience project'. The project was designed so that it would be aligned with the GEC's RIVER Ranger program that adopts a community engagement approach that has been successfully implemented in the country since it was initiated in 2004.

The RIVER Ranger program itself has been proven to successfully reduce the cause of environmental problems that affect the river ecosystem. By adopting a civic-science approach, the community frequently is involved in the process of raising awareness, improving knowledge and skills, and carry out an initiative that supports their common cause.

To support the civil society who have initiative and are capable to contribute and demonstrate the best management practices for community-based water and river care program in Malaysia, the National River Care Fund was established. Besides, the DID and GEC both of which are the partners of MyWP have involved the community in the program or project design in their recent River of Life project through a public outreach program. This develops a sense of ownership among the target groups so that they can take good care of their river.

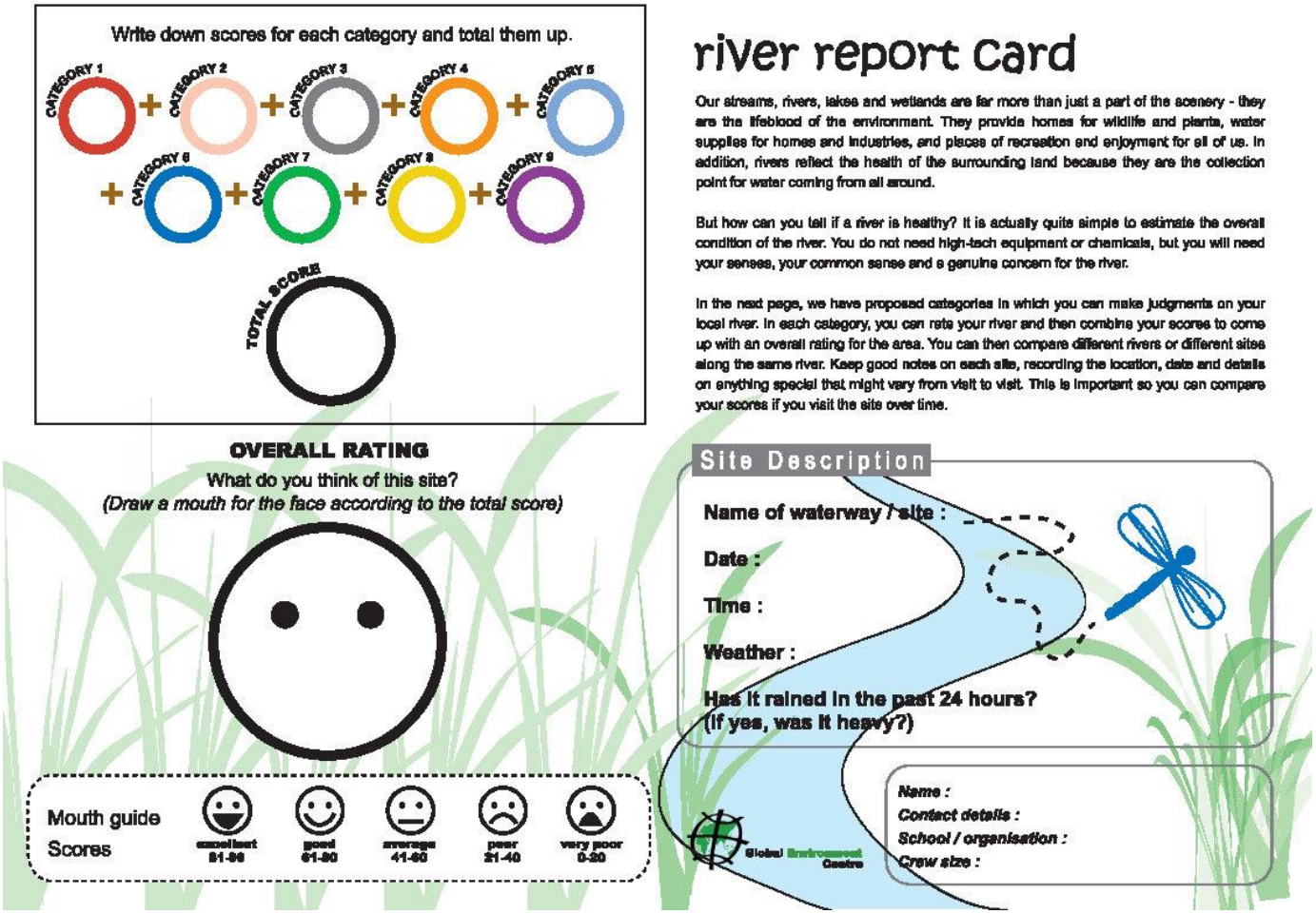
8. Contact Details

Adhitya Wirayasa (Mr)

adhitya.wirayasa@gwpsea.org / adhit.wirayasa@gmail.com

9. Annex

Annex 1 River Report Card, Biological Monitoring



category 1

land use

List down the different land uses in the area.

rating	characteristics
0-1	Lots of industry nearby, most land are cleared, bare soil, disturbed environment
2-4	Some industry, some land cleared
5-9	Some commercial, recreational and residential use
10	No human use at all, in its natural state.

* Create a list of places where the water is coming from.

Your Rating

category 2

rubbish

Make note of the type of rubbish that can be found in the water or surrounding area (this include human made waste and natural litter such as leaves and animal faeces) and how much is there.

* If rubbish seems to collect in one area, take photo of the area each time you monitor your site so you can compare rubbish build up.

Your Rating

rating	characteristics
0-1	Lots of human made rubbish such as tyres, plastics and cans, oily films and excessive algae growth
2-4	A lot of human made waste such as cans and plastic, or algae
5-7	Some human made waste such as garden waste and plastics
8-9	One or two pieces of human made waste and local vegetation such as leaves floating in the water
10	No human use at all, preserved in its natural state

category 3

pipes & drains

Look for pipes, drains or trenches leading into your waterway. Record what's coming out of the pipes, drains or trenches.

rating	characteristics
0-1	A number of pipes from industry and/or sewage treatment and/or urban storm water
2-4	Some pipes or trenches
5-7	No pipes from industry, but some urban storm water drainage
8-10	No pipes or drains

Your Rating

category 4

extra structures/modifications

Record any extra structure/modifications along the river at the site such as weirs, concrete banks, piers or any artificial modification of the water flow

Your Rating

rating	characteristics
0-1	A number of artificial structures, large modifications of river's natural flow
2-4	Some artificial structures or some flow modifications
5-7	No concrete structures or minimal modifications of water flow
8-10	No extra structures or artificial modifications

category 5

smell

Take a water sample and record the smell.

Your Rating

rating	characteristics
0-1	Very strong, unnatural chemical smell
2-4	Strong, unnatural smell
5-7	Stronger decaying smell, or slight, unnatural smell
8-9	Very slight smell, perhaps natural decay
10	No smell / natural smell

category 6

water conditions

What colour is the river's water? Is the water clear or turbid?

* Record the flow of the water (slow, rapid, not flowing)

Your Rating

rating	characteristics
0-1	Milky brown or green colour with particles and scum. You can hardly see through it
2-4	Cloudiness and/or greenish colour with particles or film
5-7	Some colour and particle
8-9	A little colour
10	Colourless and as clear as tap water

category 7

vegetation

Look at the banks and the land extending from the river. Note if vegetation is natural or introduced and whether erosion occurs or not.

Your Rating

rating	characteristics
0-1	Lots of introduced plants, much clearing, bare ground, pasture. Extensive erosion.
2-4	Mixed plants, much clearing, large, eroded areas
5-7	Mixed native and introduced plants. Some clearing. Small corridor of vegetation. Minor erosion.
8-9	Mainly native plants, minor clearing. Natural vegetation extending up to 30m from water. No erosion.
10	Mainly undisturbed native plants, extending up to 30m from water. No erosion.

category 8

vertebrate animal life

(birds, reptiles, fish, amphibians & mammals)

Sit by your river and look for vertebrate animal activity. Record both the variety and number of animals. Look for fish and listen for frogs.

Your Rating

rating	characteristics
0	No animal life visible at all
1-2	One type of animal life
3-5	Two types of animals found
6-8	Three types of animal life found
9-10	More than three types of animal life found

* Using bird books, learn the names of the birds found around the site and compile a list.

category 9

water movement

(voice of the river)

How fast does the water flow?

Your Rating

rating	characteristics
0-1	Stagnant, still and shallow
2-4	A little movement of mixing of water, shallow depth
5-7	Movement at the speed of a slow walk, wind waves
8-9	Good movement, the speed of a fast walk, wind waves
10	The speed of running or faster, wind waves, bubbly sound

map your area

Draw your local area map here and use a key to identify and record the different types of land use/human activities or other points of interest.