# RIVER Ranger

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## 1. Introduction

Malaysia is one of the twelve mega-diversecountries in the world. Over 15,000 known flowering plants, 1,500 terrestrial vertebrates and 150,000 invertebrates are found in the diverse terrestrial, marine and other aquatic habitats in the country. This rich biodiversity represents Malaysia's rich natural heritage. It is also blessed with abundant rainfall every year. This has been the source of life to our 150 river systems, with 100 of them in Peninsula Malaysia and 50 in Sabah and Sarawak. These river systems consist of 1800 rivers with a total length of 38,000 km.

Malaysia, like other countries in the world, is now facing problems of environmental degradation, which left un-checked, will threaten the well-being of the people. The main environmental problems in this country are:

1. River pollution due to sewage waste and effluents from factories and industries, agriculture and residential areas.
2. Deforestation due to forest land being cleared for agriculture and other development and illegal logging of forest trees.
3. Air pollution due to industries, transportation and open burning.

Malaysia has developed their own initiative to tackle these problems. Conservation, rehabilitation and protection have become preferred actions in handling environmental degradation as prevention rather than cure is now the main concept. This was achieved through proactive Environmental Education. Many of today's environmental challenges are complex and problematic, and they cannot be solved by public laws alone. Addressing these issues will require citizens who are informed and environmentally literate and are

willing to translate knowledge into action.

Environmental Education (EE) is fast gaining the attention it deserves especially after its importance was stressed at the IUCN Convention in Rio de Janeiro in 1992. The Malaysian government has taken up the call to incorporate EE in its development programmes. Environmental Education is theprocess of recognising values and clarifying concepts in order to develop skills and added tools necessary to understand and appreciate the inter-relationship among man, his culture and his bio-physical surroundings. Environmental Education has reached a juncture where it is positioned to become an equal partner with enforcement as a strategy for environmental management.

## 2. GEC's Environmental Education Programme

Global Environment Centre is a Malaysian non-profit organization which coordinates local and global programme activities addressing key environmental problems. GEC has been very active for the past 10 years in the conservation of natural and man made resources through Environmental Education within their three programme areas: River Care Programme, Forest & Conservation and Awareness & Capacity Building Programme.

### Objective

1. To enhance awareness of the importance of sustainable environmental management (protection, conservation & rehabilitation)
2. To provide knowledge & basic skills to assess, identify, understand, resolve and monitor environmental problems
3. To assist, initiate, and motivate the public to participate in activities and/or initiate actions to safeguard the environment and acknowledge their achievement

## 3. Approach

Knowing and understanding about the environment and the problems doesn't necessarily

lead to action. What really matters is the local action taken by the local community. With this in mind, GEC has developed and promoted Civic Science as a tool to engage community participation in local actions. The Civic Science concept is about helping people to develop an emotional bond with the environment. It involves 3 steps: awareness, knowledge and skill which will lead to action. The process empowers community members with the knowledge and skill to take action and begin their own environmental initiatives. This can happen through community environmental education programmes such as the SMART Ranger and RIVER Ranger Programmes by GEC. These programmes educate people about the solid waste management issues and river management issues in Malaysia and teaches them the skills needed to take action for themselves and therefore gives ownership of the environment back to the people.

| Awareness | Knowledge | Skill | ACTION |
|---|---|---|---|
| exhibition, posters | books, leaflets | training, demonstration | river monitoring forest conservation recycling, |

4. Target group

Managing our environment is all about managing people because the ultimate decision makers for environmental conservation are individuals - you and me. Governments, NGOsand others have a responsibility to lead and inform the public, but finally it is an individual choice made billions of times a day that counts the most. Therefore, GEC's EE programme is developed to cater for all levels of communities:

I. Public - Local community; General public
ii. Organization - NGOs & CBOs (Non-Government & Community Based Organization)
iii. Learning institutes - Schools, Colleges, University
iv. Government - Local authorities, federal agencies
v. Private sectors - Part of CSR (Corporate Social Responsibility)
vi. Service providers - Rubbish collector, sewage operator

## 5. Environmental Education Tools

The right tools for an EE programme are vital to ensure the success of any programme or activities. In GEC, we have developed our own tools like the RIVER Report card (Appendix), customized river-based projects and many others. Besides that, we also use toolsdeveloped by other local or international organisations. Below are some of the tools that can be used:

i.Powerpoints presentations
ii. Printed materials - brochures, leaflets, books
iii. Equipments - testing, quantifying
iv. Site - case study, experience & understanding
v. Module - training,
vi. VCD/DVD
vii. Website

## 6. Environmental Education Methods

Choosing the right and relevant methods is essential to have an effective EE programme. It is based on the target group, time period, objective or goals and resources as well. The methods to carry out an EE programme are:

### I. information transmission

i talk, lecture, meeting, exhibition & media
ii. participation
iii workshop, discussion & consultation, training of trainers
iv. self-effective learning
v training, demonstration, discovery, problem solving/critical thinking, experiments, simulations, role playing & dramatization

vi. site & issue based
vii investigations, site/field visit, outdoor teaching strategies

## 7. Environmental Education Scope

There are 2 areas of EE programmes in GEC: green & brown issues. Green issues focus on conservation & protection of ecosystems like forests and local fish species. The brown issues arerelated to daily life like littering, water pollution and air pollution. In Malaysia, GEC is focusing on brown issues that are synonymouswith water related projects as well as local community participation projects.

## 8. Environmental Education Types

There are two types of EE projects in GEC: education based & activity based.

### i. Educational based projects

- General environmental education
- Specific resource - based education – water, rubbish
- Specific issue - based education – pollution, erosion
- Specific environmental day events – World Water Monitoring Day
- Education on how to initiate localized projects – local community project
- Corporate awareness – resource management

### ii. Activity based projects

- Local Participation Programme in River Management in Malaysia –one state one river programme
- SMART Ranger & RIVER Ranger Programme – sustainable resources initiative
- Establishment of Environmental Proactive Community Group – Friends of Kelana Jaya Park
- Youth Programme – Rakan Muda Alam Sekitar
- Corporate Social Responsibilty (CSR) – river adoption

## 9. Environmental Education Implementation & Sustainability

GEC has developedkey steps on how to initiate and sustain EE projects.

I. Step 1 – introduce Civic Science: awareness, knowledge, skill
ii. Step 2 - help/assist in initiating Local Action
iii. Step 3 – inculcate Project Ownership within local community
iv. Step 4 - give project proponents or owners the Recognition
v. Step 5 - make sure enough Publicity given to successful projects
vi. Step 6 - always link local projects with bigger or global projects by to ‘Be part of something BIG’
vii. Step 7 – build networking with relevant parties

## 10. Case study

# RIVER Rangerprogramme

### Introduction

The RIVER Ranger Programme developed through the SMART (Start Managing All Resources Today) Ranger Programme, a programme on how to manage our resources, both natural and man-made, developed by GEC. The programme began with a focus on Solid Waste Management and teaching public the importance of resource management and recycling. As it progressed, the training modules began to develop another angle - one that linked improper solid waste management to the state of our rivers.

Soon it was clear to see that this could be developed into another education programme by itself as it involved many more issues, and needed a focus of its own. After the success of the SMART Ranger Programme, the RIVER Ranger programme was created with an aim to teach public about our water resources, and rivers and their ecosystems.

### Objectives

1. To increase community members' awareness and knowledge in managing resources
2. To provide living skills to community members for use in local environmental management
3. To coach community members on ways to evaluate and audit river basins
4. To develop a data base on local rivers
5. To motivate community members to initiate water/river conservation projects in their areas

## Approach

Global Environment Centre prides itself in being the first in Malaysiato introduce the concept of "Civic Science" as a way to approach community participation in rivermanagement. It means giving the people the awareness, knowledge and, most importantly, skill to take action on environmental matters.


## Modules

The RIVER Ranger Programme covers 5 training modules, including an half-day hands-on practical field training at the nearest river.

### Module 1: River & River Basin - Water, Man & River

This module gives an introduction to what is a river and a river basin, and to rekindle the relationship between humans and rivers, which is water.

### Module 2: The Malaysian Scenario

This module gives an overview on the current status of rivers in Malaysia and Malaysia's

water quality ranking at a global level. It also highlights the main sources of pollution here in Malaysia - industrial, agricultural and residential, and the effect and impact on humans especially on our drinking water and health. Finally, the pollution phenomenon: algae blooms and alien fish domination

**Module 3: Integrated River Basin Management**

Teaches students about the Integrated River Basin ManagementConcept, which is how to look after rivers by considering the whole river basin rather than just the river. What is the proper way and integrated approach to managing our rivers? It needs the involvement of all parties: the government, private sector and public. How we can make a difference? The way forward is civic science - awareness, knowledge and skill for the general public, which will lead to action.

**Module 4: Field Training Information**

This module gives important information on how to actually audit and monitor rivers in the field, and what equipment and safety procedures are needed. It also briefs community members on the different parameters that need to be measured and what they represent in terms of water quality.

**Module 5: On-site Practical Field Training**

Community members will be taken to the river and carry out river mapping and river health check activities to assess the health of the river. This involves mapping out the area of the river basin and noting down all the different land uses and activities going on in the river basin. This will help to identify any sources of pollution. They are also asked to do a physical observation assessment of the river's environment. Following this, they are taught how to do chemical and biological monitoring to assess the quality of the water in the river by using simple tools and the small animals (invertebrates) actually living in the river. Biological monitoring is an important part of the assessment, as it shows people that there are actually living organisms inside the river that depend on the river for its survival – that the river is a living entity, and not merely a path for water to flow.

## Establishing a Community RIVER Ranger Programme

Establishing the RIVER Ranger Programme in a local community is a 5-step process:

### Step 1: Identification Process

Before we can begin anything, GEC needs to identify the local issues in the community as well as all the stakeholders involved. This will allow us to develop a relevant plan of action for the area.

### Step 2: Consultation Process

Once the stakeholders have been identified, GEC will liase with relevant local authorities and government agencies, such as Department of Drainage & Irrigation, Department of Environment and City Council, local service providers, community leaders and local communities and arrange a consultation meeting. This meeting is required to listen to the views of everyone involved and to discuss the action plan. Once the activities have been agreed on, invitation letters and registration forms will be sent out to everyone.

### Step 3: Training

Local community members will be trained by qualified RIVER Ranger Trainers or GEC staff, based on training modules prepared by GEC. Upon completion of the modules, they will be given a certificate of recognition and they will be fully certified RIVER Rangers. As RIVER Rangers, they are responsible for educating fellow friends and neighbours in their local area on water resource management, water conservation, sustainable water usage and wastewater management. At the same time, they will be able to monitor and help conserve their local rivers and its basin. They should also prepare a Local Action Plan for their next course of action.

### Step 4: Action

Their duties are to carry out river monitoring in their area and to undertake the following

activities:

• Conduct river auditing and mapping activities to identify issues and problems in the local river basin.

• Develop a schedule for river observation and pollution and water quality monitoring. Data needs to be collected.

• Start water management projects/initiatives at home or in their community - water conservation, rainwater harvesting, water recycling

• Take part in global events such as World Rivers Day and World Water Monitoring Day

### Step 5: Data collection and Reporting

To ensure the sustainability of the programme, the community must be encouraged to continue monitoring the river. They will be provided their very own blog to upload information on their monitoring activities as well as their data. The compiled data will also be exhibited on the RIVER Ranger website (www.riverranger.net). This will give them a sense of ownership and responsibility to the programme and river that they are monitoring. On top of that, they have to produce quarterly summary reports of their activities and data to GEC and provide reports to their local politicians or relevant government agencies to initiate action against polluters based on their observations or start their own rehabilitation activities.

Through this monitoring process, the community members can keep track of any changes in the water quality and share their findings with the wider public and relevant stakeholders.

## RIVER Ranger Communities

### Shah Alam Community

Twenty-four community members from 12 different zones in Shah Alam were trained as

RIVER Rangers. The programme was supported by a private sector company, Johnson Controls Automotive Holdings Sdn. Bhd., in collaboration with GEC and the local authorities, Shah Alam City Council.

The programme was established through the 5-step process and currently, Johnson Controls has allocated one staff member to supervise one zone each to ensure the sustainability of the programme.

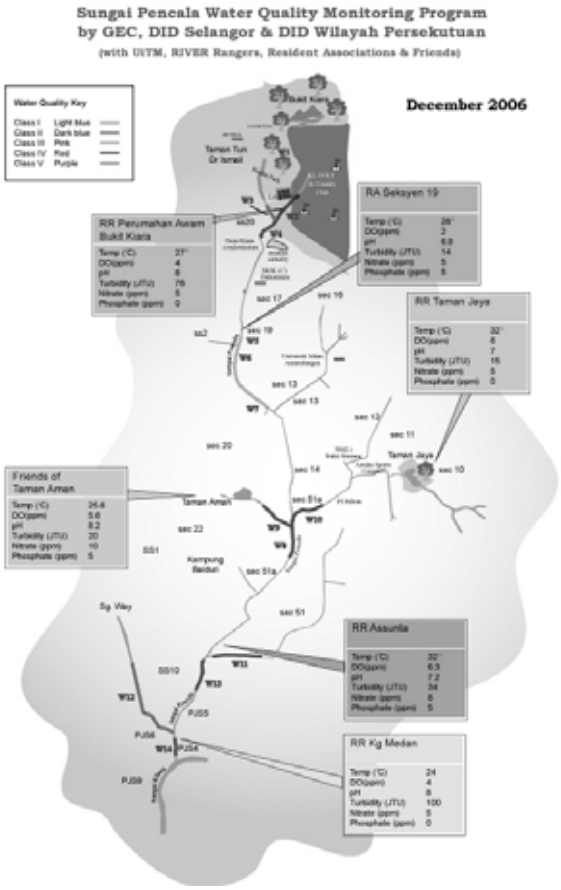
### Friends of Kelana Jaya Park

Friends of Kelana Jaya Park were formed in 2003 to take charge of the Kelana Jaya park and help maintain its environment. GEC, in collaboration with the Petaling Jaya City Council, helped train 15 members to be RIVER Rangers. They continue to take regular water quality measurements and are in close contact with GEC and the local authorities.

### Bukit Kiara Longhouse Settlement

The longhouse is located very near to the Pencala River. The children of the longhouse were trained by GEC to be RIVER Rangers to educate them on the importance of rivers.

## Outcomes of RIVER Ranger Community Activities

# Appendix

Write down scores for each category and total them up.

CATEGORY 1 + CATEGORY 2 + CATEGORY 3 + CATEGORY 4 + CATEGORY 5 + CATEGORY 6 + CATEGORY 7 + CATEGORY 8 + CATEGORY 9

TOTAL SCORE

**OVERALL RATING**

What do you think of this site?

*(Draw a mouth for the face according to the total score)*

Mouth guide

Scores

| excellent | good | average | poor | very poor |
|---|---|---|---|---|
| 81-90 | 61-80 | 41-60 | 21-40 | 0-20 |

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 there is.

| 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 |

Your Rating

* 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.

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

| 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 |

Your Rating

category 5

**smell**

Take a water sample and record the smell.

| 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 |

Your Rating

category 6

**water conditions**

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

| 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 |

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

Your Rating

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.

| 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. |

Your Rating

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.

| 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.

Your Rating

category 9

**water movement**

*(voice of the river)*

How fast does the water flow?

| 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 |

Your Rating

**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.

# river report card

Our streams, rivers, lakes and wetlands are far more than just a part of the scenery - they are the lifeblood of the environment. They provide homes for wildlife and plants, water supplies for homes and industries, and places of recreation and enjoyment for all of us. In addition, rivers reflect the health of the surrounding land because they are the collection point for water coming from all around.

But how can you tell if a river is healthy? It is actually quite simple to estimate the overall condition of the river. You do not need high-tech equipment or chemicals, but you will need your senses, your common sense and a genuine concern for the river.

In the next page, we have proposed categories in which you can make judgments on your local river. In each category, you can rate your river and then combine your scores to come up with an overall rating for the area. You can then compare different rivers or different sites along the same river. Keep good notes on each site, recording the location, date and details on anything special that might vary from visit to visit. This is important so you can compare your scores if you visit the site over time.

**Site Description**

**Name of waterway / site :**

**Date :**

**Time :**

**Weather :**

**Has it rained in the past 24 hours?**
**(if yes, was it heavy?)**

*Name :*
*Contact details :*
*School / organisation :*
*Crew size :*

Global Environment Centre

# 환경교육 프로그램의 예시

# RIVER Ranger

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Global Environment Centre

## 1. 소개

말레이시아는 세계에서 12개의 mega-diverse 나라 중의 한곳이다. 15,000종 이상의 알려진 화초, 1500종의 척추동물과 150,000종의 무척추동물이 다양한 지상, 바다 등 다른 수생서식지에서 발견된다. 이러한 다양성은 말레이사아의 풍부한 자연유산을 의미한다. 매년 풍부한 강우량도 장점중의 하나이다. 이러한 점이 말레이시아 반도에는 100개, Sabanr가 Sarewak에는 50개, 총 150개의 river system의 삶의 근원이 되어왔다. 이러한 river system은 38,000km길이의 1,800개의 강으로 이루어져있다.

세계의 다른 국가들처럼 말레이시아 환경문제 역시 해결되지 않으면, 인류의 삶을 위협할 수 있는 환경악화의 문제에 직면할 수 있을 것이다. 말레이시아의 주요한 환경문제는 다음과 같다.

1. 상수도 쓰레기와 공장 산업시설, 농장, 가정으로부터의 폐수로 인한 강의 오염
2. 농업과 개발을 위해 베어지는 숲과 불법 벌채로 인한 산림의 황폐
3. 산업과 교통, 화재로 인한 대기오염

말레이시아는 이러한 문제를 해결하기 위해 해결책을 만들어오고 있다. 막는 것이 해결하는 것 보다 더 중요하기 때문에 보존, 재건, 보호는 환경오염문제를 해결하기 위해 선호되는 행동이 되었다. 이것은 적극적인 환경교육을 통하여 가능하다. 오늘날 환경문제의 대다수는 복잡하고, 이러한 문제는 단지 법으로만 해결될 수 있는 것은 아니다. 이러한 문제를 처리하는 것은 정보를 얻고, 환경에 대한 자각이 있는 그리고 지식을 행동으로 실천할 수 있는 사람들을 필요로 한다.

환경교육은 1992년 Rio De Janrio에서 열린 IUCN회의에서 강조되면서 더 많은 관심을 얻고 있다. 말레이시아 정부는 개발계획에 환경교육을 넣기 시작했다. 환경교

육은 환경문제 해결을 위한 전략을 강요하는 동등한 동반자로서의 역할을 하게 되는 위치에 도달했다.

## 2. GEC의 환경교육 프로그램

GEC는 환경문제를 해결하기 위한 지역과 세계의 프로그램 활동을 조절하는 비정부 조직이다. GEC는 지난 10년 동안 세가지 프로그램(River Cre programme, Feorest& Conservtion and Awareness & Cpacity Building Programme) 범위 안에서 환경교육을 통하여 자연환경, 인간이 만든 환경의 보존을 위해 활동해 오고 있다.

**목표**

1. 지속적인 환경관리(보호, 보존, 재건)의 중요성을 인식
2. 환경문제를 접근하고 이해하고 해결하고 모니터하는 지식과 기본 스킬을 제공
3. 대중이 환경을 보호하고 그들의 성과를 인정하는  활동에 참가하거나 행동을 하도록 돕고 동기부여

## 3. 접근방법

환경과 환경오염에 대해 알고 이해한다는 것이 꼭 행동을 유발하는 것은 아니다. 실제로 중요한 것은 지역사회에 의한 지역 활동이다. 이러한 것을 염두 해 두고 지역 활동에 지역사회의 참여를 활성화시키기 위한 Civic Science를 개발하고 촉진시켰다. Civic Science의 컨셉은 사람들이 환경에 대한 유대감을 갖도록 돕는 것이다. 이것은 세가지의 단계로 이루어졌다. 인식, 지식, 행동으로 이어지는 스킬. 그 과정은 지식과 스킬을 가진 지역민들이 행동을 취하고 그들 자신의 환경에 대한 제안을 하도록 한다.  이것은 GEC의 SMART Ranger 나 River Ranger Program과 같은 환경교육프로그램을 통해 발생할 수 있다. 이러한 프로그램은 사람들이 Solid waste문제나 강문제에 대하여 알리고 스스로를 위해 행동을 취할 기술들을 가르치고 환경에 대한 소유권을 사람들에게 되돌려 준다.

| 인 식 | → | 지 식 | → | 스 킬 | → | 액 션 |
|---|---|---|---|---|---|---|
| 전시<br>포스터 | | 책, 리플렛 | | 트레이닝<br>demonstration | | 하천 모니터링<br>숲보존<br>재활용 |

## 4. 대상그룹

궁극적으로 환경보호에 대한 결정을 내리는 사람은 우리자신들이므로 환경에 대한 관리는 사람들을 관리하는 것이다. 정부와 NGO와 다른 조직들은 대중에게 정보를 주고 이끌 책임이 있다. 그러나 하루에도 여러번 생각하도록 만드는 것은 개인의 선택이다. 그러므로 GEC의 EE프로그램은 모든 대상에게 제공하도록 개발된다.

ⅰ.공공 - 지역사회, 일반공공기관
ⅱ.조직 - NGO&CBO(Non - Government & Community Based Organization)
ⅲ.교육기관 - 학교, 대학, 대학교
ⅳ.정부 - 기초자지단체, 광역자치단체
ⅴ.사적 영역 - CSR(Corporate Social Responsibility)
ⅵ.서비스 제공자 - 쓰레기 수거인, 상수도 운영자

## 5. 환경교육 교구재

EE프로그램에 대한 적합한 교재는 프로그램과 활동의 성공에는 필수적이다. GEC에서 우리는 RIVER Report, 정해진 강에 기반을 둔 프로젝트 같은 우리자신의 교재를 개발했다. 더불어 우리는 다른 지역이나 국제조직에서 개발된 교구재를 사용했다. 아래는 사용될 수 있는 교구재의 일부이다.

ⅰ. 파워포인트 프리젠테이션
ⅱ. 유인물 - 브로셔, 리플렛, 책
ⅲ. Equipment - 실험, quantify
ⅳ. Site - 사례연구, 경험과 이해
ⅴ. 모듈 - training
ⅵ. VCD/DVD
ⅶ. Website

## 6. 환경교육방법

적당한 교육방법을 찾는 것은 효과적인 EE프로그램에 필수적이다. 대상그룹과 시기, 주제와 수단을 찾는 것이 중요하다. EE프로그램이 실행하는 방법은 다음과 같다.

ⅰ. 정보전달

· 대화, 강의 , 회의, 전시&미디어

ⅱ. 참여

·워크숍, 토론&상담, 트레이너의 훈련

ⅲ. 자가학습

·훈련, 예시, 발견, 문제해결/비판적인 사고, 실험, 자극, 역할연기&dramatization

ⅳ. site&issue based

·investigtion, 현장방문, 야외훈련전략

## 7.환경교육 범위

GEC의 환경교육에는 두가지 영역이 있다. green은 숲이나 물고기 종과 같은 생태계의 보호와 보존에 초점을 맞춘다. brown은 쓰레기, 수질오염, 대기오염과 같은 일상 삶과 관련이 있다. 말레이시아에서 GEC는 수질과 관련된 프로그램 뿐 아니라 지역사회의 참여 프로젝트와 같은 Brown에 집중한다.

### 8. 환경교육 유형

GEC에는 두 가지의 환경프로그램이 있다. : 교육기반&활동기반

ⅰ. 교육에 기반을 둔 프로젝트

· 일반적인 환경교육

· 특정한 자원에 기반을 둔 교육 -수질, 쓰레기

· 특정한 이슈에 기반을 둔 교육- 오염, 부식

· 특정한 환경의 날 이벤트- World Water Monitoring Day

· 지역프로젝트를 만드는 교육 -지역사회 교육

· corporate awareness - resource management

ⅱ. 활동에 기반을 둔 프로젝트

· 말레이시아의 River mangement에서 지역참여 프로그램 - 한 지역에 하나의 강 프로젝트
· SMART Ranger & RIVER Ranger programme - 지속적인 자원 개발
· 환경에 적극적인 커뮤니티 그룹의 설립 - Friends of Kelana Jaya Park
· 청소년 프로그램 - Rakan Muda Alam Sekitar
· Corporate Social Responsibility(CSR) - river adoption

## 9. 환경교육의 이행과 지속성

GEC는 EE프로그램을 촉진하고 지속하기위한 몇 가지 단계를 만들었다.

ⅰ. step 1 - Civic Science를 도입 :인식, 지식, 스킬
ⅱ. step 2 - Local Action을 만드는데 돕기
ⅲ. step3 - 지역사회 안에서 Project Ownership 가르치기
ⅳ. step4 - 프로젝트 제안자나 소유자에게 Recognition 제공
ⅴ. step5 - make sure enough Publicity given to successful projects
ⅵ. step6 - "be part of something BIG'로서 지역 프로젝트를 글로벌 프로젝트와 연계
ⅶ. step7 - 관계기관과 네트워크 구축

## 10. 사례연구

## RIVER Ranger 프로그램

### *도입*

RIVER Ranger프로그램은 GEC에 의해 개발된, 자연과 인간이 만든 자원을 관리하는 프로그램인 SMART(Start Managing All Resources Today)Ranger Programme을 통해 만들어졌다. SMART R 프로그램은 Solid Waste Management에 초점을 맞추고, 자원관리와 재활용의 중요성을 대중에게 인식키기기 위해 발전되

었다. 점차 진행됨에 따라 , 훈련 모듈은 또 다른 각도로 발전되었다. - one that linked improper solid management to the state of our rivers
곧, 더 많은 이슈들을 포함하게 되자, 또 다른 교육프로그램으로 발전될 수 있다는 게 분명해졌다. SMART Ranger Programme의 성공 후에 , RIVER Ranger programme은 대중에게 수질자원과, 강, 그리고 생태계에 대해 가르치는 것을 목적으로 탄생되었다.

*목적*

1. 자원관리에 대한지역주민의 인식과 지식 증대
2. 지역 환경관리에서 사용을 위한 지역주민들의 리빙스킬 제공
3. 강 유역을 평가하고 감시하는 방법을 지역민에게 코치
4. 지역의 강에 대한 데이터 베이스 발전
5. 수질이나 강 보전계획 건립에 대한 동기부여

*접근방법*

GEC는 하천 관리에 대한 커뮤니티의 참여를 위한 방법으로 "Civic Science"의 개념을 도입하기 위해 말레이시아에서 처음으로 세워졌다. 이는 사람들에게 인식, 지식, 가장 중요한 환경문제에 대한 행동을 위한 스킬을 제공함을 의미한다.

*모듈*

RIVER Ranger Programme은 가까운 강에서 반나절을 보내는 현장학습을 포함한 5개의 훈려모듈을 가진다.

*모듈1 - River & River Basin - water, Man& River*

이 모듈은 하천과 하천유역이 무엇인지 에 대한 소개와 인간과 하천사이의 관계를 돋우는 것이다.

*모듈2 - The Malaysian Scenario*

이 모듈은 말레이시아에 있는 하천의 현 상황과 세계에서 말레이시아의 수질상태 순

위를 조망하는 것이다. 또한 말레이시아에서 오염의 주된 요인을 강조한다. -산업, 농장, 주거지역,
그리고 사람에게 특히 식수와 건강에 미치는 영향을 강조한다. Finally, the pollution phenomenon: algae blooms and alien fish domination

*모듈3 : Integrated RIVER Basin Management*

Integrated RIVER Basin Management에 대해 가르친다. 단지 하천보다도 전체 하천유역에 대해 고려함으로써 하천들을 살피는 방법, 하천을 관리하는데 어느 방법이 적당하고, 관련된 접근방법인가를 교육하고 있다. 이는 모든 관련단체의 협력이 필요하다 : 정부, 사적영역과 공적역역. 어떻게 차이를 이끌어내느냐? 그 방법은 civic science - 인식, 지식, 행동을 이끌어낸 스킬이다.

*모듈4 - 현장학습정보(field Training Information)*

이 모듈은 실질적으로 현장의 하천들을 어떻게 감시하고 모니터하는지에 대해, 어떤 장비가 필요한지, 필요한 안전절차는 어느 것인지에 대한 중요한 정보를 제공한다. 또한 지역민들에게 측정될 필요가 있는 다른 영역과 수질에 대해 나타내는 것이 무엇인지를 알려준다.

*모듈5 - on - site practical Field training*

커뮤니티 구성원은 강으로 가서 river mapping과 하천의 상태를 진단하는 활동을 할 것이다. 이러한 것을 하면서 간단한 장치나 실질적으로 그곳에 살고 있는 조그마한 동물을 이용하여 그들은 하천에 있는 수질을 화학적으로 생물학적으로 모니터하는 방법을 배우게 된다. 하천이 단순히 물이 흐르는 통로가 아닌 삶의 공간이고 생존을 위해 하천에 의지하는 살아있는 유기체들이 있다는 것을 사람들에 보여주기 때문에 생물학적인 모니터는 평가에 있어 중요한 부분이다.

*Community RIVER Ranger Programme의 실행*

지역사회에서 RIVER Ranger Programme을 실행하는 것은 5단계의 과정을 거친다.

*step1 : 인정과정(Identification prosess)*

어떤 일을 시작하기 전에 GEC는 이해관계를 포함한 커뮤니티의 문제를 인정할 필요

가있다. 이것은 우리가 해당지역을 위한 상대적인 계획이나 행동을 만들도록 돕는다.

*step2 : 상담과정(consultation process)*

이해당사자가 정해지면, GEC는 Department of Drainage & Irrigation, Department of Environment and City Council과 같은 관련 있는 지역 당국이나, 정부기관, 지역의 서비스 공급자, 지역유지와 접촉을 하고 상담미팅을 정한다. 이러한 모임은 관련이 있는 모든 사람의 이야기를 듣고 실행계획을 논의하는데 필요하다. 실행방안에 대해 정해지면, 초대장과 등록신청서가 각 집에 보내진다.

*step 3 : 훈련 (training)*

지역사회의 구성원은 GEC가 준비한 훈련모듈에 근거해서 숙련된 RIVER Ranger 트레이너나 GEC의 직원에 의해 훈련을 받을 것이다. 이 모듈을 끝마치면, 그들은 수료증을 받게 되고 자질을 갖춘 RIVER Rangers가 될 것이다. RIVER Ranger로서 그들은 그 지역의 동료나 이웃들에게 하천자원관리, 물보존, 지속적인 물의 사용, 폐수처리에 대한 교육을 할 책임이 있다. 동시에, 그들은 해당지역의 하천과 그 유역을 모니터하고 보존하는 일을 한다. 그들은 또한 다음 실행을 위한 Local Action Plan을 준비해야한다.

*step4 : 실행(Action)*

RIVER Ranger의 의무는 하천모니터링을 하고 다음을 실행 하는 것이다.

- 지역의 하천유역 문제를 인식하기 위해 모니터링하고 행동을 설정하기
- 하천관찰과 오염, 수질상태 모니터링 하는 스케줄을 짜고, 데이터를 축적하기
- 가정이나 커뮤니티에서 물 관리 프로젝트를 시작 : 물 보존, rainwater havesting, 물재활용
- World Rivers Day나 World Water Monitoring Day 같은 세계적인 행사에 참가

*step5 : 데이터 축적과 보고(Data collection and Reporting)*

프로그램의 지속을 위해, 해당 커뮤니티는 하천을 계속 모니터링하도록 장려해야한다. 그들은 데이터 뿐 아니라 모니터링활동에 대한 정보를 업로드하기 위해 자신들의 블로그를 만들 수 있을 것이다. 축척된 데이터는 RIVER Ranger website (www.riverranger.net)에서도 볼 수 있다. 이러한 것은 그들이 해당 프로그램과 그들이 모니터링하는 하천의 주인이라는 의식과 책임감을 부여해준다. 그들은 GEC에 활동과 데이터에 대한 분기별 요약보고서를 제출해야하고, 관찰에 따른 오염원에 대

한 행동을 이끌어 내고, 자신들의 재건활동을 시작하기 위해 지역정치인이나 관련된 정부당국에게 보고서를 제출한다.

## *RIVER Ranger Communities*

### *Shah Alam Community*

Shah Alam에 있는 12개의 각기 다른 존에서 24명의 커뮤니티 구성원은 RIVER Rangers로서 훈련받는다. 프로그램은 GEC와 협력관계에 있는 Johnson controls Automotive Holdings Sdn. Bhd같은 사기업이나, 관계당국 Shan Alam시의회의 지지를 받고 있다.

프로그램은 5단계의 과정은 걸치고, Johnson Controls는 현재 프로그램의 지속성과 한 존을 감시하기 위해  한명의 직원을 배치했다.

### *Friends of Kelana Jaya Park*

Friends of Kelana Jaya Park는 Kelana Jaya park를 살피고, 그 환경을 유지하기 위해 2003년에 만들어져다. Kelana Jaya시의회와 협력하고 있는 GEC는 15명의 구성원이 RIVER Rangers로서 훈련받도록 도왔다. 그들은 정기적으로 수질오염을 체크하고, GEC와 지역당국과 긴밀한 관계를 맺고 있다.

### *Bukit Kiara Longhouse Settlement*

Longhouse는 Pencala강과 가까이에 위치해있다. longhouse의 어린이들은 하천의 중요성을 교육받기 위해 RIVER RANGERS가 되도록 GEC에 의해 훈련을 받았다.