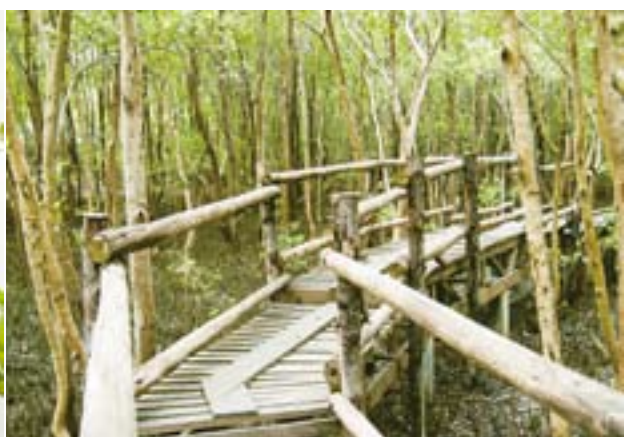




Making **Mangrove Eco-Museums**

| *Workshop Papers*



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Introduction

Regional Workshop
Chachoengsao, Thailand
19-28 March 2007
Organised by SEAMEO-SPAFA
in collaboration with the Bangpakong Bovorn
Witthayayon School



*River and flora
at Bangpakong,
Chachoengsao*

Mangroves support eco-systems of biological diversity, and are sources of productivity in terms of aquaculture, fisheries and forestry. The mangrove swamps provide aquatic nurseries (breeding ground for several types of fish, shellfish and a wealth of marine life forms); complex and diverse wildlife habitats; shoreline stabilization

which protects coastal areas from severe wave damage and erosion; and also maintain the quality of coastal waters (by trapping, immobilizing or absorbing heavy metals, pesticides and inorganic nutrients which would flow to the sea). With this understanding, establishing museums out of mangrove swamps contributes to the conservation and management of mangrove eco-systems. The museums also perform the role of disseminating information that enhances public awareness and appreciation of the importance of mangroves. In the Philippines, Vietnam and Thailand, mangrove plantations are grown in coastal regions for the ecological, social and economic benefits they provide to coastal fisheries and communities, and the establishment of eco-museums in mangrove swamps, which exist in most of the countries in Southeast Asia, are of immense benefit to the region.

Between 19 and 28 March 2007, SEAMEO-SPAFA organised a Regional Workshop on Making Mangrove an Eco-museum, hosting twenty-five participants from



Entrance to
the Bangpakong
Mangrove
Eco-Museum

different parts of Southeast Asia, for about ten days near a mangrove (by the Bangpakong Bovorn Witthayayon school) in the Chachoengsao province of Thailand. As part of the workshop, the participants made presentations, discussed, explored the mangrove, and co-operated in finding ways to improve the Bangpakong mangrove museum, where the workshop was conducted.

The workshop involved a multidisciplinary group of museum professionals, environmental and marine science experts, architects, artists, teachers and students from nine Southeast Asian countries (the list of participants is on page 151).

They have been gathered together to discuss and assist one another in achieving the objectives of promoting the establishment of eco-museums in mangrove swamps; increasing interest and understanding among museum personnel and other professionals in the conservation and management of mangrove eco-systems; and supporting research and sustainable management, rational utilization and rehabilitation of mangrove environments.

The workshop helped to further the appreciation that mangroves support eco-systems of biological diversity, and are sources of productivity in terms of aquaculture, fisheries and forestry. With sessions that touched on aquatic breeding ground for fish, shellfish and other marine life forms, participants learned about the complex and diverse wildlife habitats; shoreline



Arrival of workshop
participants

stabilization which protects coastal areas from severe wave damage and erosion; and the role of coastal waters.

Beyond the Philippines, Vietnam and Thailand, where mangrove plantations are grown in coastal regions for the ecological, social and economic benefits (to coastal fisheries and communities), the establishment of eco-museums in mangrove swamps, is of immense significance to most of the countries in Southeast Asia.

As the workshop was held at the Bangpakong Bovorn Witthayayon School, which has developed its own eco-museum in the mangroves, the workshop participants also aimed at helping the school improve



Workshop
discussions at
the Bangpakong
Bovorn Witthayayon
School

the management of its museum and mangrove eco-systems. At the end of the workshop, and having had spent more than a week together, the participants expressed genuine affection for each other as well as gratitude for the experience of having worked and played together, with a great spirit of co-operation and many moments of fun. Among the recommendations in concluding the workshop were a call for the museum to include a narrative in museum displays and a site plan in the vicinity; establish a laboratory for scientific study; produce a mini guide booklet; improve the drainage and landscape; and develop the local community.

The workshop commenced with a speech given by Dr. Pisit Charoenwongsa, SEAMEO-SPAFA Director, to an audience which included H.E. Professor Dr. Wichit Srisa-an, Minister of Education of Thailand, Director and staff of Bangpakong Bovorn Witthayayon School, President of the School Alumni Association, distinguished delegates and participants.

Dr. Pisit remarked that it was an honour that the guests and participants accepted the invitation to grace the opening ceremony of our workshop. He proceeded to inform about the school which was hosting the event, and also SEAMEO-SPAFA and its mission, which was to “work with the school to raise awareness of the importance of the mangrove as one of the very many types of educational resources”.

He said that “whatever you have near and in your school compound can be made teaching and learning materials. We believe in the concept of ‘interconnectedness’, just as scientists have elaborated that ‘everything is connected to everything else’.”

As for the history of the museum of the school, it was planted in 1975 with the initiative of the then Director Thamnoon Wisaichosu, and was nurtured to become, in the first place, a study area of environment for students. It has subsequently been improved by all school administrators and has won many environmental awards so far.

In 1998, after the celebration of the school centennial, a working group led by H.E. Professor Dr. Wichit Srisa-an was set up to plan for the establishment of a museum in the school compound as an integrated learning centre on nature and culture by making use of the mangrove as educational resources first and then extending to cover other activities beyond mangrove use.



Dr. Pisit Charoenwongsa, and staff of the school receive H.E. Prof. Dr. Wichit Srisa-an, Minister of Education, Thailand



Dr. Pisit Charoenwongsa, SEAMEO-SPAFA Director

It was the school's Alumni Association's Museum Committee, chaired by H.E. Professor Wichit Srisa-an, that conceived the idea of developing the school area into a museum and centre for educational and recreational purposes. The museum was officially opened on 17 November 2001.

Dr. Pisit took the opportunity to elaborate on SPAFA's regional programmes that focus on the following areas: archaeology, fine arts, visual arts, art education, architecture, museology, performing arts, cultural resource management, cultural heritage management, and tourism.

SEAMEO-SPAFA is focused on (1) longer-term sustainable programming and (2) working in partnership, with the belief that the most effective results are obtained from such endeavours, through combining resources – not just funds but people also – and avoiding duplicating efforts. Operating under the motto of *Educating for Sustainable Development through Cultural Resource Management*, the Centre has identified community involvement as the real or key issue that needs attention because of the emphasis on people and their relationship with conservation and heritage. Dr. Pisit said that the Centre firmly believes that to safeguard heritage and to develop programmes that



Minister of Education Prof. Dr. Wichit Srisa-an addresses workshop participants

will be sustainable, “they must be inclusive, i.e. they must involve all interested parties. This is why we are so pleased to be involved in this community project here at Bangpakong and to see the active participation of the local community”.

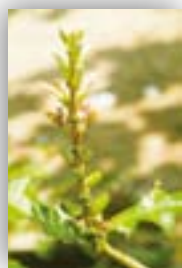
He commented that Southeast Asia is rich in resources and that “we are aware these resources require wise management. To make wise management a reality we try to maximize the benefits of networking, building relationships, learning from each other, and developing strong mutually beneficial partnerships”.

In conclusion, Dr. Pisit thanked the audience, and said that the Centre believes that over the coming days, the workshop would indeed help to improve upon ‘wise-management’ strategies, directly benefit the museum at the school, and also the work of all participants from around the region.

Following the SEAMEO-SPAFA Director’s opening remarks, H.E. Professor Dr. Wichit Srisan-an, the Minister of Education, Thailand, was invited to address the audience.

He began by saying that it was a great pleasure to welcome the participants and all to the workshop here in his home province of Chachoengsao, and that it was indeed reassuring to see so many delegates from Southeast Asia as this reaffirms the importance attached to the careful and resourceful management of mangroves.

H.E. Professor Dr. Wichit said that when we think of mangroves, we think of aquatic nurseries and complex and diverse wildlife habitats. “As we know, mangroves support eco-systems of biological diversity, and are sources of productivity in terms of aquaculture, fisheries and forestry. Another very important aspect of mangroves is shoreline stabilization as they can help protect coastal areas from severe wave damage and erosion. Sadly it took the tsunami of 2004 to really highlight this fact. The establishment of museums out of



Mangroves support eco-systems of biological diversity

mangrove swamps can contribute to the conservation and management of mangrove eco-systems”.

In Thailand alone, he said that the destruction of mangroves must be stopped, pointing out the latest survey of the United Nations Environment Programme (UNEP) which estimated that mangrove coverage has shrunk from 1.14 million rai in 1961 to 446,062 rai in 2006 as a result of encroachment for shrimp farming, illegal logging, and coastal erosion.

He added that eco-museums can disseminate information to raise public awareness and appreciation of the importance of mangroves, and the local communities living near mangroves become the guardians and conservators of the mangrove plantations themselves.

This is the idea at Bangpakong. As well as promoting community involvement, there is also the unique opportunity to directly reach youths as the Bangpakong Mangrove Eco-Museum is situated within eleven hectares of land and mangroves that also houses the Bangpakong Bovorn Witthayayon secondary school.

H.E. Professor Dr. Wichit informed that the school’s alumni association, which includes Dr. Pisit and himself as members, has been advocating the development and establishment of an eco-museum as well as a water culture and sports centre for the school. He remarked that the school has been fortunate to have SEAMEO–SPAFA’s regular technical and academic assistance on this matter.

As the first regional workshop to be held at the school, he believed that the knowledge and experience of the participants would generate “a tangible outcome that will be the better management of the Bangpakong mangrove eco-systems and the improved presentation and display of our mangrove eco-museum ‘exhibits’”.

He wholeheartedly agreed with the SEAMEO -SPAFA Director that the mangrove of the school represents one of a number of types of resources for



*Visitors on a tour
of the school
mangroves/
eco-museum*

education, and he encouraged the use of it as an example of resources a school or community may have available in plenty that can be used for educational purposes for all.

H.E. Professor Dr. Wichit wished all the best in the endeavour over the days, and looked forward to studying the outputs and recommendations arising from the workshop.

Following the Minister's key address, workshop presentations began. After each session, a period of discussion was added in which all the participants freely shared their ideas and thoughts in an informal and relaxed atmosphere.

The 10-day workshop also included tours of the mangrove Eco-Museum at the Bangpakong Bovorn Wittayayon School; short play sketches created and performed by the participants touching on the issues relating to wet lands and the environment; research compilation of information, and working with the students and teachers; an exhibition on mangroves and products made by the school; and leisure trips to an ancient market in Chachoengsao Province, as well as Pattaya Beach.



*Pisit
Charoenwongsa*

The Bangpakong Mangrove Eco-Museum Project

Many schools have museums or study collections but few schools have mangroves. The Bangpakong Bovorn Wittayayon, a secondary school in Thailand, has the uniqueness of being the only school with both the mangrove and a museum, the Bangpakong Mangrove Eco-Museum.

The school develops the museum as a paramount means of preserving and cultivating appreciation of the environment, and it is perhaps the first of its type in Southeast Asia.

When we think of museums, we think of a group of buildings constructed to keep or display objects of interest. The Bangpakong Bovorn Wittayayon school chose to present a different concept of museum, one which is not confined to specialists.

The concept is based on the belief that everything can be made into a museum, and thus it is possible for the general public to build their own museum the way they think is good for education.



*Walkways in the
school mangrove
habitat*

The Concept of Eco-Museum

“Eco-Museum” may seem to be a new term and type of museum, but the concept is not. It is believed that the word emerged in 1971, and refers to a museum dedicated to the environment (the idea was developed in France and Algeria).

The eco-museum, evolving from the ‘open-air’ museum model, is essentially made up of two inter-related museums – a spatial, unconfined, no-walls museum; and an enclosed temporal one. This kind of museum has a role in the education and culture of a very wide audience, and a community that can see its past, feel its present, and be involved in its future.

The School

The SEAMEO Regional Centre for Archaeology and Fine Arts (SPAFA) has been working closely with the administration and Alumni Association of the Bovorn Witthayayon School in developing and establishing the eco-museum, and water culture and sports centre among the community of the school and its vicinity of mangrove plantations, natural vegetation, and maritime habitat.

The Bangpakong Bovorn Witthayayon School is located in Chacheongsao Province (to the east of Bangkok), Thailand. It is one of the ninety-two schools established



Students of
the school guide
visitors through
the mangrove
areas

in 1897 in what was then Siam during the reign of King Rama V (1868-1910).

The school, with about eight hundred school children and eighty teachers, is like any other ordinary secondary school in Thailand. It is unique, however, in its commitment to global environmental concerns. As the school is situated amidst a mangrove environment, its administration finds the natural surrounding – covering eleven hectares of land and mangroves – a resourceful area to turn into a centre for environmental studies.

SPAFA has been extending regular technical and academic assistance to the school on the development of programmes relating to culture and nature, the Bangpakong Mangrove Eco-Museum, and Water Culture and Sports Centre.

The Bangpakong Environment

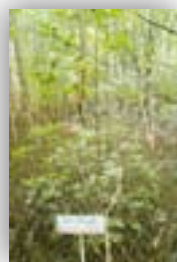
Surrounding the Bovorn Witthayayon school and the community are mangrove plantations, natural vegetation, and maritime habitat, and the Bangpakong River along it. Primarily to preserve its pristine environment and culture, a community involvement project was initiated by SPAFA to create an eco-museum out of the area, and to make it a model for museums that different to the usual structure of huge closed buildings that house collections of objects of beauty, rarity, and antiquity.



Information
on resources in
the area

The Eco-Museum of Mangrove

At the Bovorn Witthayayon school, the mangrove is the museum. This outdoor museum represents both a museum and a classroom without walls, and is open to all who come for recreation or to study the nature and culture of the mangrove. The area concerned is composed of water, earth, and organisms, which include plants and animals cohabitating with human beings, and depending on each other for sustenance.



A school and an
outdoor museum

The museum was conceived at an alumni meeting, chaired by Professor Wichit Srisa-an, when SPAFA Centre Director proposed a new type of museum to showcase the mangrove existing in the school environs. The Alumni Association's Museum Committee, chaired by Professor Wichit Srisa-an, conceived and proposed the idea of developing the school area into a museum and centre for educational and recreational purposes.

The eco-museum can accommodate between forty and fifty visitors at a time. There are elevated walkways over the water, leading to the view and study of various kinds of plants, marine life-forms, a collection of donated boats, all of which provide the visitor substantial information for understanding type, physiography, and function.

There is also a pavilion to display temporary and special exhibitions that highlight the relevance of the mangrove or museum to the community, and raises awareness whilst instilling a sense of communal protection for it. Scientific information is presented on signboards, in an easily comprehensible format; and focuses on various aspects of the mangrove community: the ecology of mangroves and its importance, effective practices in management of its preservation and restoration, and the uses and functions of mangroves (emphasizing the long-term yield to be obtained for the improvement in mangrove dwellers' quality of life, for instance).

What impresses is the way the school teachers and students have utilised the knowledge on the mangrove as a content in many school subjects. In the teaching of Thai language, for example, the mangrove is used as an inspiration for the writing of poems and the composition of songs and music.

As such, the mangrove is integrated in many lessons and subjects, an advanced concept in education that is not confined only to the curriculum set up by the Ministry of Education of the national government.

In teaching science, for instance, the species of plants and animals are presented in a direct and straightforward



Environmental
resources are
studied in classes



The Bangpakong
river

manner because they are found right on the school environs, as such, they have direct access to the species and their habitat. These lessons can expand into finding ways to use the species for the food industry, medical industry, or use in dyeing.

Interestingly, drawings found all over the eco-museum were drawn by students of science instead of art students, showing how well the students understand the lessons through their ecological surroundings.

The mangrove initiated by the school administration as a centre for environmental studies has so far won many environmental awards.

Naturally, as an on-going project, the eco-museum is evolving, and is not entirely complete in its present form and state.

The museum is presented as a centre of ecology that could be developed into many other related projects in the future, such as on water culture and recreation.

Water Culture

Water is our prime commodity, and has influenced important economic and political aspects of life for centuries. On a community level, water has affected the way in which people carried out business, how they travelled, and even provided opportunities for recreation.

Communication and trade via rivers became factors in the growth of early societies. A traditional way of life is

still visible on the banks of the Chao Phraya River and associated canals in Bangkok.

People are alienating themselves from nature, and this is partly a result of the notion that an urban lifestyle is more attractive and prosperous than remaining tied to rural traditions. In the modern age, the use and abuse of water has become a serious environmental concern.



Display of a royal
statement at the
museum

A Royal Concern

The concluding statement that follows is a royal statement made by H.M. the King on 10 May 1991, which is on display at the Bangpakong Eco-Museum, a place where the King's message is poignantly relevant:

“Mangroves help sustain the ecosystem of coastal habitats and the Gulf of Thailand. Yet it is now being encroached upon and depleted by exploiters who care only for their own benefits. Measures have to be taken to protect, conserve, and increase mangrove acreage, especially of the *Rhizophora* (kongkang in Thai), which is rather difficult to germinate because of the fluctuation of tide water. Concerned governmental agencies, such as the Department of Forestry, the Department of Irrigation and the Naval Hydrographic Department, should work together to find appropriate places to germinate the *Rhizophora* and thus sustain the growth of the mangrove.”

Setting Up Nature Education Centres and Interpretation Programmes

Noor Azlin Yahya,
Forest Research
Institute, Malaysia (FRIM)

The first presentation, 'Setting Up Nature Education Centres and Interpretation Programmes', of the workshop was made by Noor Azlin Yahya, Forest Research Institute, Malaysia (FRIM) (full presentation on page 24-36). Dr. Yahya said that nature education can be defined as learning about nature and enhancing awareness of natural resources and conservation. Nature Education Centres (NEC) or eco-museums have been built to serve as a base where one can find the resources (human or material) to facilitate such learning activities. It is a place where a group of people (ranging from school children to members of the public or a private company) learn about nature through programmes designed to enhance their understanding and appreciation of the environment.

One principle of an NEC is to use the surrounding environment or forest as a living classroom. The presenters added that NECs have to reflect the value of the biodiversity of the surrounding area, as well as the aspirations of the partners and local communities. They should be managed professionally to achieve their maximum objectives.

NECs?

1. Natural environments are scarce, especially in urban areas. Hence, NECs or eco-museums are crucial in bringing nature and urban inhabitants together.



Noor Azlin Yahya

2. NECs will cultivate a way of learning environmental ethics for living which will lead to sustainable human development in the long run.
3. Nature education itself is a form of enhancing human communication and quality of life.
4. NECs serve as a link between the local people and nature, activating community involvement and inspiring awareness and appreciation of nature through increased sense of ownership.
5. Well-designed programs will enhance environmental values and concepts in the school curriculum, encouraging engaged outdoor learning.

Aims of a Nature Centre

1. To promote environmental awareness and understanding of the relationship between people and their surroundings through experiences that encourage personal discovery, group interaction, and respect for the natural environment.
2. Make nature education accessible and affordable.
3. Ensure the sustainability of education programmes.

Setting up an NEC

1. Agreement with the local government

This is to ensure the legal use of the NEC and its immediate vicinity. It will also ensure smooth implementation of the project. Such an official agreement will demonstrate the participation and commitment of necessary stakeholders.

2. Financial Planning

Budget has to be carefully allocated. Initial start-up funds have to be channelled to establish a physical infrastructure. The housing may be in the form of a newly-constructed building or an existing and renovated building. There would be costs incurred for electrical systems, furniture purchase, computer systems, etc. Staff salaries, utility and transportation costs have to be taken into consideration.

3. Advisory Committee

The NEC must be perceived as belonging to the community. At the same time, it needs the communication and support of related organizations, such as NGOs, heritage agencies, or recreational societies. Hence, an advisory committee has to be set up to discuss and recommend the programmes to be conducted, as well as to evaluate the progress of the NEC.

Setting up an NEC Program

1. Identify Target Groups

The different sectors of target audience can be classified as: schools (primary and secondary); teachers; colleges and institutions of higher learning; youth clubs; adult members or non-members; corporate groups; planners, administrators, or government officials; potential sponsors; scientists or specialists; “friends” of the centre who may be committed to assisting in activities.

2. Human Resource Management

The success of any NEC is highly dependent on the allocation and deployment of its human resources, both the staff and the local community volunteers.

3. Structure of Planning

Planning at each stage must be consciously made with education and awareness goals in mind. An NEC has to identify the conservation message/theme; the facilities needed; the facilities available; the level of interpretation needed for each group of intended users; the skills each group needs to learn; the attitudes to be encouraged; and an evaluation plan/programme.

4. Considerations

A good NEC programme would recognize the complex interrelationships of the ecosystem, the environment, and the people. It has to acknowledge that changes

are achieved slowly, especially in relation to attitudes, and it is important to maintain consistent efforts. It has to realize that success speaks for itself and therefore track records and success stories are effective ways to motivate people. Finally, it is essential to “package” the message, for the product is as important as the message itself.

5. Code of Conduct

Most people live at the “small picture” level; hence effective awareness is needed to link bigger issues to the local or immediate context. As far as indigenous knowledge and systems are concerned, there is nothing to lose by balancing the knowledge of modern scientific systems with the wisdom of indigenous systems.

Incorporating Environmental Interpretation

Environmental learning, or interpretation, occurs best in informal settings. This is because such settings are educational as well as entertaining. Such an approach would have the important effect of opening up and affecting people’s otherwise conservative attitudes and behaviour. The presenters defined environmental interpretation as a technique of communication, a two-way process based on listening to, and understanding, the perceptions of the individual or group. It attends to the need to communicate technical information to non-technical audiences. It translates the technical language of a natural science into terms and ideas that non-scientists can readily understand. It does so by adopting a method that is entertaining, informative, and sustaining at the same time.

It was also emphasized by the presenters that the interest of the audience has to be captured through an organized and easy-to-follow presentation that promises to be rewarding. The process for an NEC programme should aim at educational, emotional and

behavioural changes in the audience. It ideally proceeds in the following sequence: interpretation - attraction - exposure - understanding - appreciation - environmental protection.

The must-have elements of interpretation, according to learning expert Freeman Tilden, consists in relating, revealing, and provoking. They combine in a holistic way, often involving art, expression and analysis. Analogies, comparisons, personal anecdotes should be used to relate to what the audience knows and cares about. The emphasis should be on relationships rather than facts and figures. The tone should be human, pleasurable, relevant, fun and meaningful, for people may forget specific details but not their feelings of the event they have experienced. The presentation was concluded with an assertion from the speakers that the theme is always central to the interpretation, and, as in every good story, there is a clear beginning and an end.



Centers should aim to

- Promote environmental awareness and understanding relationship between people and their environment through experiences that encourage personal discovery and group interaction as well as respect for the natural environment
- Ensure sustainability of the education programmes
- Make nature education accessible and affordable

- Nature education: learning about nature and enhancing awareness on natural resources and conservation
- NEC/Eco-museum: A place, a centre or base where one can find the resources (materials or human) to facilitate activities
- A place where a group of people (ranging from school children, public or private company) learn about nature through programmes that enhance their understanding towards nature.

One of the principles of a Nature Education Centre should be "to use the surrounding environment or forests as a classroom".

- NECs should be managed professionally, reflecting the value of the biodiversity in the surrounding area and, aspirations of the partners and the local communities

Need for Nature Centres

As an outdoor classroom where lessons/programmes on environment can be conducted saves habitat, provides opportunity to gain awareness of habitat values to people and the living things within it, provides connection to the natural world, so that environmental ethics can be developed

- Well-designed programmes, serve to enhance environmental concepts in school curriculum



Utilizing the natural resources available such as lakes and shrubs found near the area



Need for Nature Education Centres

- Growing interest and demand for nature and environmental education
- Few NECs near urban areas, almost all are found close to forested areas
- Access for school visits and support the requirements for outdoor learning



The centre serve as a link between the local community and nature



The idea of community involvement in conservation project is to inspire awareness and appreciation toward nature through the sense of ownership

Steps in Establishing Nature Centers

Agreement with the local government

- Ensuring legal usage of the centre and its immediate area
- Facilitates smooth implementation
- Demonstrates the agencies commitment and participation in EE

Designing the NEC's Infrastructure

Infrastructure design should be simple, practical and functional



Example: FRIM/MNS/Shell



Financial plan - Budget and Funding



Initial start-up funds

- Could be a newly constructed building or a renovated, existing building.
- Construction cost, other costs e.g. lighting, furniture, air-conditioning, audio-visual aids, electrical appliances, computer system, etc.

Operations budget
Staff salaries, utility bills (electricity & water), transport costs, etc.

Example: FRIM/MNS/Shell



Advisory Committee

Support of several organizations including NGOs

The Centre must be perceived as belonging to the community.

The Advisory Committee is established to:

- Discuss & advise with regards to programmes to be conducted
- Evaluate progress of the NEC




Target groups

- Schools - primary and secondary
- Teachers
- Colleagues and institutions of higher learning
- Youth clubs
- Adults members or non-members
- Corporate groups
- Planners, administrators or government officials
- Potential sponsors
- Scientists or specialists
- "Friends" of your centre that may be committed to assist you in the activities
- Others

Human Resources requirement



The success of an NEC is highly dependent on its human resources, the staff and the local community



Code of conduct for educational programmes

Most people live at the "small picture" level, effective awareness need to link bigger issues to the local or immediate context

- Indigenous knowledge and systems: nothing to lose by balancing the knowledge of modern scientific methods with indigenous systems.
- Properly trained or have access to EE resources.

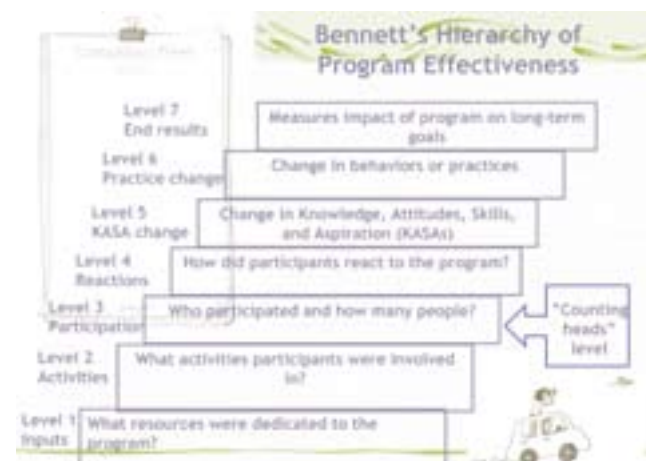



Education and awareness plan identifying:

- The Conservation message or the theme
- The facilities needed
- The facilities available
- The level of interpretation needed for each group of your intended users
- The skills that each group needs to learn
- The attitudes to be encouraged
- An evaluation plan or programme




Make it fun and voluntary



Considerations for nature education programmes

- Recognise the complex inter-relationships of ecosystems, environment and people.
- Recognise that changes are achieved slowly especially in relation to attitudes. Important to maintain consistent efforts.
- Recognise that success speaks for itself. Therefore track records and success stories are effective methods to sensitize people.
- Recognise that "packaging" your message or product is as important as the message itself.





The implementation of the programmes will depend on:

- Human resources - will only be properly delivered with the appropriate education staff.
- The number of staff will depend on set up.
- Facilities - "what unique points or experiences", e.g. indoor and outdoor facilities, garden collection, herbarium, research facilities and public conveniences
- Budget
- Educational materials
- Local support group or volunteers





Incorporating Interpretation Programmes

- Environmental learning or interpretation occurring in informal settings
- Educative
- Entertaining
- Positively affecting people's conservation attitudes and behaviour



What is Environmental Interpretation?

- A technique of communication
- A two way process, based on listening and understanding the perceptions of the individual or group
- Ultimately interpretation should provide an answer to the question "so what?"



What is Environmental Interpretation?

- An approach to communication, the need to communicate technical information to non-technical audiences
- Translates technical language of a natural science field into terms and ideas that non-scientists can readily understand
- Involves doing it in a way that is entertaining and interesting to the audience



Environmental Interpretation programmes

- Improving environmental education
- Parks & protected areas have resources
- Environmental Interpretation (E.I) is translation of the technical language of the environment for the laymen without loss of accuracy
- Answering the "so what?"



What is Environmental Interpretation?

- "an educational activity, which aims to reveal **meanings** and **relationship** through the use of original objects, by firsthand experience and illustrative media, **rather than simply to communicate factual information**"



Freeman Tilden

McArthur

'Interpretation is a coordinated, creative and inspiring form of learning. It provides a means of discovering the many complexities of the world and our role within it. It leaves people moved, their assumptions challenged and their interest in learning stimulated.'

Moscardo

'Interpretation is any activity which seeks to explain to people the significance of an object, a culture or a place. Its three core functions are to enhance visitor experiences, to improve visitor knowledge or understanding, and to assist in the protection or conservation of places or cultures.'

Environmental Interpretation

- Conservation communication to the various segments of people
- Serves as a knowledge bridge to achieve important **objectives**, which are **educational, emotional and behavioural** change
- Attractive and convey messages interesting enough to sustain audience's concentration



Environmental Interpretation



- Interest has to be captured
- Organized in an easy to follow presentation to be rewarding
- Interpretation → attraction → exposure → understanding → appreciation → protection

Must-have elements of interpretation (Freeman Tilden)

- Relate
- Reveal
- Provoke
- Whole
- Art
- Children
- (Audience analysis)



Environmental Interpretation

- Examples, analogies, comparison and personal experience to relate to what audience knows and cares about
- E.g. ourselves, families, values, principles, beliefs
- About ideas and relationship rather than isolated facts and figures
- Pleasurable, entertaining, relevant and meaningful



- Human dimensions are interesting as they gave the personal characteristics
- Needs suitable preparation
- Create interests
- People may forget a specific thing, but not the way it made them feel





- ✓ The theme is always very important in interpretation
- ✓ Like a story that has a beginning and an end
- ✓ The theme, punch line, or the moral to the story could be revealed in advance for emphasis



- ✓ At the most, humans are able to capture only five main ideas at one time

Environmental Interpretation Products

- ✓ Personal: interpretation, slide talks, talks, programmes
- ✓ two-way conservation communication strategies



Environmental Interpretation Products

- ✓ Non-personal: interpretive dioramas, panel displays, signs, wayside exhibits
- ✓ one-way conservation communication strategies

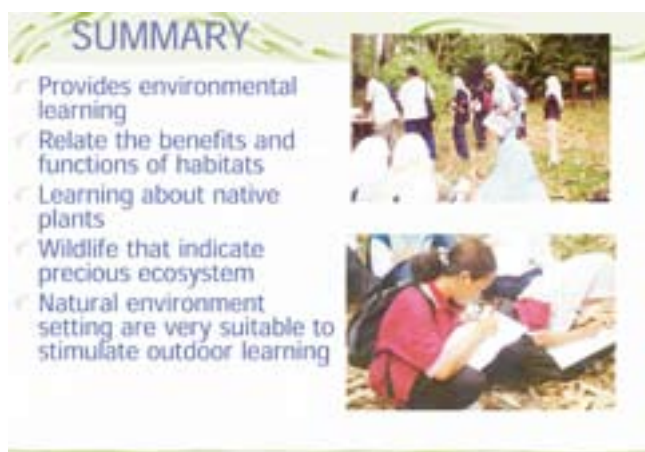


Environmental Interpretation Products



Environmental Interpretation Products





Ha Long Bay – A World Heritage

Hoang Thi Ngoc Ha and Hguyen Thu Huyen
Ha Long Eco-Museum,
World Nature Project,
Ha Long Bay Management Dept,

The presenters for 'Ha Long Bay – A World Heritage' (full presentation on page 41-58) articulated that Ha Long Bay is a world natural heritage, twice recognized as such by UNESCO. In 1994, it was awarded this status for its outstanding aesthetic value, and, again, in 2000 for its geological and geomorphological value.



Hoang Thi
Ngoc Ha



Hguyen Thu Huyen

Ha Long Bay is a concentration of thousands of limestone islands. Covering a total area 1553 square kilometres, it includes 900 named islands. The protected area is about 434 square kilometers that covers 775 islands. It is bounded by three areas, namely, Ba Ham Lake, Dau Go Island, and Cong Tay Island. These encompass hundreds of sand beaches, beautiful caves, lakes, lagoons and grottos, limestone plains and towers. There is a diversity of marine creatures and eco-systems of plants and natural life.

As the ancient home of the Vietnamese people, there is archaeological evidence of cultural relics in Ha Long Bay. Even today, there are fishing communities that have been living there for many generations, creating a truly unique Ha Long culture. Bearing such extraordinary biodiversity, this special region is under research and will be submitted to the UNESCO for the third time for official recognition.

Ha Long Bay Eco-Museum

It was asserted by the presenters that Ha Long Bay Eco-Museum adopts a holistic outlook and has a

“people-centred” strategy with the purpose of bringing people and the environment together. The project represents a new approach aimed at raising community awareness and responsibility for the living heritage of Ha Long Bay and its environs through the development of an effective interpretative tool system. It also aims to develop sustainable tourism, create more jobs and contribute to poverty alleviation.

In 2000, a feasibility study plan was devised which drew much attention from relevant Vietnamese institutions and local communities. From July 2000 to February 2001, with a donation from the UNDP, as well as technical assistance from the Ministry of Culture and Information and UNESCO’s National Commission, the feasibility plan was carried out. According to the speakers, despite difficulties and challenges, it produced important results that have contributed to the success of the entire Ha Long Bay Eco-Museum project.

The Ha Long Bay Eco-Museum is essentially conceived in two parts. Part 1 consists of the Hub which promotes facilities for environmental studies and knowledge of the natural heritage. The facilities include the interpretation centre, the exhibition room, the study room, the data centre and the GIS centre. At the Hub, one finds a playground for children, a botanic garden, an aquarium, and an activity area where there are art and handicrafts workshops.

Part 2 of the Ha Long Bay Eco-Museum comprises Outdoor Themes. Classified as the natural and cultural heritage of the Quang Ninh Province, the museum is officially a national museum with 12 outdoor themes. These include the Ngoc Ving Retreat, Bai Tho Mountain, Bach Dang – a Symbol of Freedom, Me Cung archaeological site, Traditional Boat-building, Coal Mining, Ecology Hotel, Soi Sim Island, Youth in Quang Ninh, Women in Quang Ninh, Children in Quang Ninh, Cua Van Floating Cultural Centre.

Of these 12 theme projects, the Cua Van Floating Cultural centre was the first to be implemented with a donation from NORAD under the auspices of the Norwegian Embassy. The following was expounded by the speakers to spotlight on this successful project.

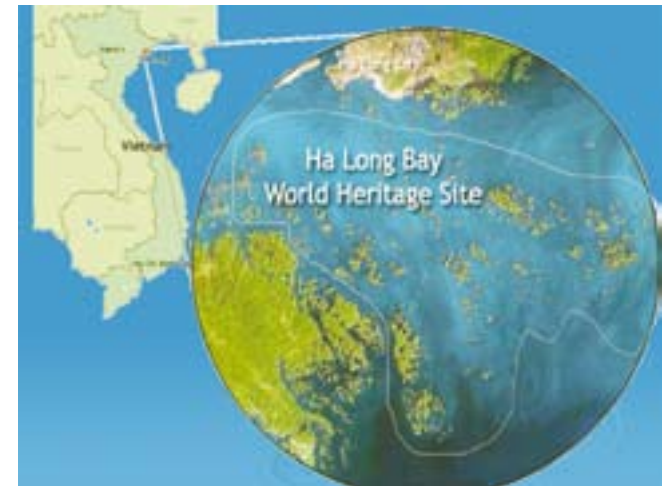
Cua Van Floating Cultural Centre

The Centre itself is located in the charming Cua Van fishing village which is one of the biggest among four fishing villages on Ha Long Bay. Targeted at the fishermen of the community, the Centre organizes both short-term and long-term training courses on management and technical skills for the preservation of tangible collections and the living heritage. It was set up to promote awareness-raising activities and to educate the communities to protect the Ha Long Bay and its values. Through performances, lectures and exhibitions, the Centre transmits the importance of traditional and contemporary cultural assets of Cua Van.

The Centre has carried out its programmes with clear understanding of the ecology and needs of the Cua Van environment and living culture. The historic Cua Van village has 127 families and 600 people. The community economy primarily depends on fishing, as well as selling food, fresh water and fuel to tourist boats. Before 1998, most of the villagers were illiterate, but since 1998, floating classrooms have been established for children from grade one to five, with an extra class for learning adults. Each family lives on a boat that is not only a shelter but also a fishing tool and transportation vehicle. The community subscribes to traditional spiritual beliefs such as worshipping their ancestors, village founders, and sea gods. Whenever there is a wedding or a traditional festival, the entire village would come together to celebrate. The presenters remarked that these are cultural values that the Centre seeks to enhance and preserve.

Some of the activities that are carried out have thus mobilized community participation and consciousness. These include campaigns to raise the heritage pride of the Cua Van villagers, instilling in them a sense of home, ownership and protection of their environment. Activities are organized on World Environment Day and there has been education on garbage deposit and collection. There are training courses on being local tour guides and also trips to visit caves to assess the impact of tourism activities on the natural landscape.

As for visiting tourists, there are specially designed programmes to encourage the appreciation of the cultural values of Cua Van village. Students take part in activities such as ethnographic discussions, interviewing a fishing family, giving gifts to pupils in the village, rubbish-collecting, studying the plants on Soi Sim Island, exploring the Luon Cave, Mangrove-planting, and learning about fresh water utilization. The presenter considered all these activities by the Cua Van Floating Centre to have contributed purposefully to the sustainable conservation of Ha Long Bay on the whole.



- Ha Long Bay**
- **Total area:** 1,553km²
 - **Number of islands:** 1,969 (of which 900 islands are named)
 - **The protected area** (434 km² covering 775 islands) includes 3 areas: Ba Hâm lake, Đảo Gồ island and Công Tây island.
 - **The outstanding values:** the aesthetics, geology, geomorphology, biodiversity, history and culture.
 - **Potentials:** tourism, fishery, marine transportation, sea port, etc.

Ha Long Bay was twice recognized by UNESCO as a World Natural Heritage Site

In 1994: for its aesthetic values

In 2000: for its geological and geomorphological values.



Ha Long Bay is a place at which
thousands of limestone islands are
concentrated



Hundreds of sand beaches

Many beautiful caves



Thien Cung grotto

Mé Cung grotto

Ba Hien lake



Ha Long Bay is a geological museum

A huge limestone plain



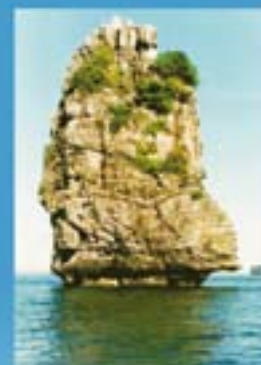
Limestone tower



"If the beautiful landscape of Ha
Long Bay reflects the shapes and
colors of the valuable jewel, so the
outstanding value of geology is the
material to create this jewel."
(Prof. Tony Waltham – The Royal
Geological Institute)



Karst cave



Ha Long Bay is diverse in marine creatures, and its eco-system
and potential.



Some endemic plants in the area

Ha Long Palm



Violet chlorita



Ha Long velvet-pool



Flora on the limestone mountains



Limestone karst

Mangroves developed along the shorelines and on the mountains of the Bay.

*The archeological value*

Ha Long Bay is an ancient home of the Viet people of the Ha Long culture. Many relics were found at the archeological sites on Ha Long Bay.



Fresh shells were found at Me Cung archeological site



Fresh shells were found at Tien Ong cave



A fishing community has settled in Ha Long Bay for generations

Ha Long Eco-Museum

- A new holistic approach



- Ha Long Eco-museum maintains a "people centered" strategy of bringing people and the environment together.
- The Ha Long Eco-Museum Project is a new approach aimed at raising community awareness and responsibility for the heritage of Ha Long Bay and its environs through the development of an effective interpretative tool system about the Heritage, including the Ha Long Eco-Museum Hub and outdoor themes.

Overview

- The Ha Long Eco-museum is a new kind of project in Vietnam, as well as in Southeast Asia, aimed at preserving heritage, enhancing community awareness and responsibility, developing sustainable tourism, creating more jobs and contributing to poverty alleviation.
- The Feasibility Study Project has drawn great attention from relevant Vietnamese institutions and local communities.
- The Ha Long Eco-museum Feasibility Study Project began in 2000 and although it faced many difficulties and challenges, it has achieved important results that contribute actively to the success of the whole Ha Long Eco-Museum Project.

A Holistic Representation of Heritage Resources in Ecomuseum Development



The Eco-Museum including 2 parts

Part I: The Hub

- Interpretation Center, Exhibition Room, Tourist Guide, Art Gallery
- The place for doing environmental studies and natural heritage.
- The Cultural Heritage Research Center
- The Hall
- Study Room
- Data Center
- GIS Center



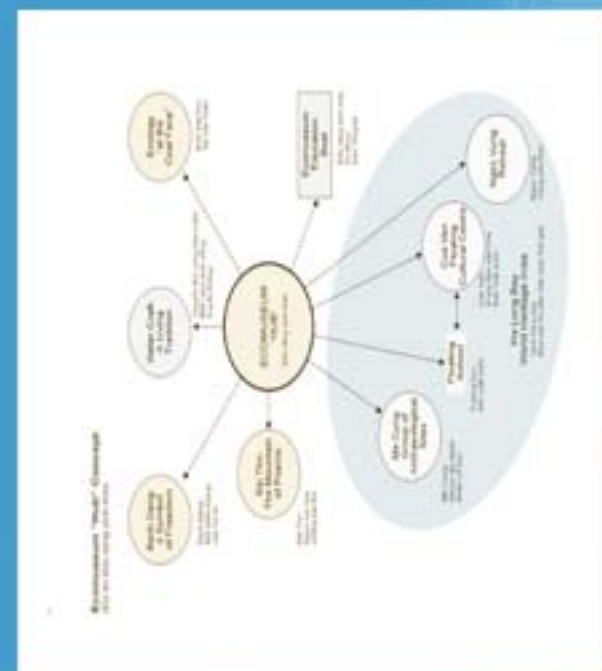
Part I: the hub

- Art workshop
- Aquarium
- Botanic garden
- Children's playground
- Exhibition and handcraft-making area
- The administrative management and technical areas
- Other items



Part II: Outdoor themes

- In 2000, Ha Long eco-museum was approved by the Viet Nam Government as a National Museum with 12 outdoor themes, linked to the natural and cultural resources of the Quang Ninh Province.
- The Ha Long Eco-Museum Feasibility study has been implemented in 2000, with the donation of UNDP and under the technical assistance of Ministry of Culture and Information as well as the National Commission for UNESCO.



12 outdoor themes

- | | |
|-----------------------------------|------------------------------------|
| • Ngoc Vung Retreat | • Ecology hotel |
| • Bai Tho Mountain | • Soi Sim Island |
| • Bạch Đằng – a symbol of freedom | • Youths in Quảng Ninh |
| • Me Cung archeological site | • Women in Quảng Ninh |
| • Traditional boat building | • Children in Quảng Ninh |
| • Coal exploration | • Cua Van Floating Cultural Center |

Cua Van Floating Cultural Center is the first project implemented with the donation of NORAD (Norwegian Embassy) (2003 – 2006).

Cua Van Floating Cultural Center

– a communal house of fishermen on Ha Long Bay



The Center was built at Cua Van fishing village – one of the biggest among 4 fishing villages on Ha Long Bay.



Organizing short-term and long-term training courses on Ha Long Eco-Museum and Cua Van FCC for Cua Van fishermen (2004).



The fishermen who work for the Center are continuing to be trained on management skills.

The training program on preservation of collections

THE FLOATING CULTURE CENTER



To raise awareness and educate the communities on protection of the Bay and its values.

To explain and conserve traditional and contemporary cultural values of the Ha Long fishermen through performances, displays and lectures.



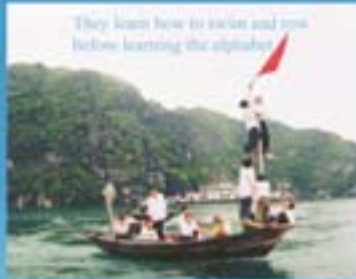
Demographics: 4 villages: 287 families, 1283 people
Cua Van: 127 families, 600 people

Economy: fishing, aquaculture and services such as selling food, fresh water and fuel for tourist boats.



Before 1998: Only a few in the village knew how to read and write, they were illiterate.

After 1998: Floating classrooms have been established for kids, they range from grade one to grade five. One extra class for adults has also been established.



"The boat is our home, the Bay is our fatherland"

Each family lives on a boat. A boat is not only a shelter but also a fishing tool and a transportation vehicle.

When a couple get married, they will move to another boat, and the gifts from their parents are fishing experience and tools.



Building a floating house



They leave when the sun sets and come home at dawn with a hold full of fish.



Some traditional spiritual beliefs



Reverence for their ancestors



Pay respect to the village founders



Worship of the sea gods



A Wedding is not only a happy day for two families but also a special day for the whole village.



A traditional festival on the Bay



Traditional folklore: A chance to make friends and get to know each other.

For a green, clean and beautiful Ha Long Bay



Support activities for the World Environment Day



A waste collection point

Cua Van fishing village and other villages on the Bay have become attractions on Ha Long Bay



Promoting educational activities to raise community awareness on heritage protection



EcoBoat offers tours and education on environmental protection

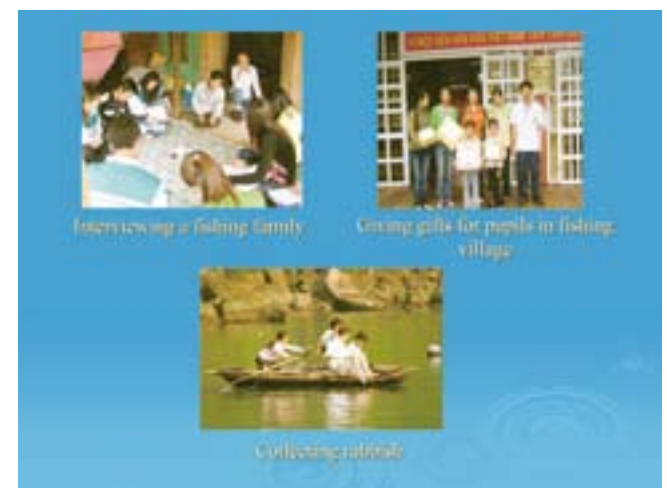
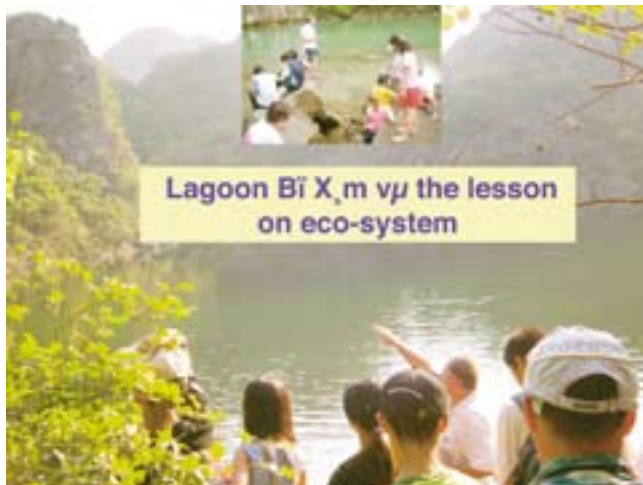


Objectives:

- Strengthening the community's consciousness and promoting their role in the conservation activities of natural, cultural and environmental values of Ha Long Bay.
- Assisting the environmental education activities in local schools.

Audience: pupils, students and teachers in local area as well as in Southeast Asia.





Discussion – Doing exercises



Studying plants on Soi Sim Island



Playing games and
appreciating the
utilization of fresh water.



Discovering Luon cave

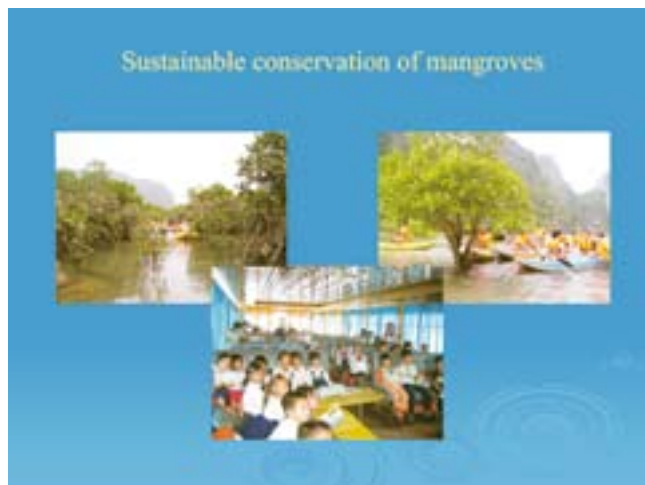


Mangroves on Ha Long Bay



Youths planting mangroves





The Site Development of the Mangrove Forest, Tabon Cave Complex

Wilfredo Vendivil and Ernesto B Toribio Jr
National Museum
The Philippines



Wilfredo
Fernandez Vendivil



Ernesto
B Toribio Jr

Dr. Wilfredo Vendivil and Mr. Ernesto B Toribio Jr presented 'The Site Development of the Mangrove Forest, Tabon Cave Complex' (Quezon, Palawan), the Philippines (full presentation on page 63-73).

Tabon Cave Complex

The Tabon Cave Complex is located at Lipuun Point at Quezon in Palawan. Its geological development dates back to some 9,000 to 10,000 years ago when it was connected to the mainland of Palawan. It was estimated that the shoreline was about 35 kilometres from the Tabon Cave. At the end of the Ice Ages, the sea level rose to its present level and the Tabon Cave Complex became an island. Over time, erosion and siltation took place and this led to the growth of the mangrove forest which links the Tabon Cave Complex to the mainland of Palawan.

The paper noted that today, the site covers 138 hectares of limestone formation and rugged cliffs, with 218 caves and rock shelters, boasting diverse habitats with indigenous flora and fauna. Archaeological finds date back to 50,000 to 700 years ago, and it has been discovered that 38 caves were used as habitation and

burial sites in the ancient times. The famous archaeologist Dr. Robert Fox and the National Museum team have unearthed sites that reveal 50,000 years of Philippine prehistory, with invaluable findings such as the Tabon man skull cap and the Manunggul burial jar.

The origin of 'Tabon' can be traced back to the local scrub fowl of the same name. The amazing biodiversity of the Tabon Cave Complex can be observed in its myriad natural habitats such as the karst forest, beach forest, coconut plantation, marine environment, and mangrove forest. The karst forest is a limestone landscape that dominates the complex, while the marine ecology encompasses beautiful coral formation, the habitat of a diverse species of fish and sea grass beds that are essential for many fish and turtles. There is also a wide variety of local species of crabs, indigenous birds like the Palawan hornbill and rare bats that reside in the caves, making the complex a vast home to natural life forms.

Preserving Tabon Cave Complex

The presenter reported that given the richness of the Tabon Cave Complex, it was declared a Site Museum Reservation pursuant to the Presidential Proclamation No. 996. As mandated by law, the National Museum is the administrator tasked to protect and preserve this reservation for the present and future generations. Site development projects have been proposed as joint efforts of various government agencies, such as the National Museum; the Department of Tourism Authority; the local government of Quezon, Palawan; and the National Commission on the Arts.

The development plans have started since 1970, with the establishment of the National Museum Branch to better administer the site museum as well as to protect and preserve the resources. Coordination has been made with the local government to impose local laws for the conservation of natural and cultural assets. Since then, ongoing efforts have been made to improve the quality

of the exhibits and carry out other works, including:

- landscaping of the ground of the branch museum
- construction of the boardwalk leading to the caves
- installation of signage on the geology, flora, fauna, and archaeological resources
- rehabilitation of the eco-tourism trails
- tour guides' training for the local community
- publication of guidebooks
- production of audio-visual materials
- establishment of co-operatives of handicraft entrepreneurs and boat owners
- development of the mangrove forest.

Development of the Mangrove Forest

The main objective of developing the mangrove forest, as the speakers described it, is to create a living laboratory to study its importance to the community and to humanity. The other specific objectives of this project are as follows:

1. To conduct an extensive study of the formation of the mangrove forest at the complex
2. To carry out an inventory of flora and fauna
3. To observe the ecological status of the mangrove forest
4. To document through photography the dominant plants and animals
5. To construct a boardwalk and observatory platforms within the mangrove forest
6. To install signage in key areas of the boardwalk
7. To prepare a guidebook on the protection of the mangrove forest
8. To involve the community in the protection and preservation of the mangrove forest

The development of the mangrove forest into an eco-museum is a significant project. As the mangrove forest connects the Tabon Cave Complex to the mainland of Palawan, it serves as a sanctuary for marine

life and birds, protecting the complex from strong waves, becoming a buffer zone as such that shelters the cultural resources of the complex.

The mangrove eco-museum features a natural winding trail along the beach forest, with a 175-metre boardwalk equipped with observatory platforms, thus serving as a living laboratory to observe the mangrove ecosystem. The signage has been installed to create awareness of the need for communal protection and preservation of the mangrove forest. The signage provides invaluable information on the geological evolution of the area; the location of the mangrove eco-museum in the complex; and the typology of plants and animals in habitation. In particular, it highlights the importance of mangrove eco-system.

The paper emphasized that at the end of experiencing the eco-museum, the visitor must carry away with him/her the message that the mangrove forest is endangered. The illegal cutting of trees and the conversion of swamps into fish and prawn ponds and for urban expansion have become widespread. If these unhealthy practices persist, ecological stability that has been in existence of thousands of years will be destroyed and the environment faces extinction.

The importance of the mangrove forest must be reiterated. It protects the coastal areas by reducing the damages caused by typhoons and strong winds. It also acts as a buffer zone protecting the sea grass beds and coral reefs. It provides sanctuary to fish and other marine organisms. It is a source of timber, firewood, dye, tannin, charcoal, thatch, alcohol, and medicine. It is an essential recreational area for bird-watching and observation of wildlife.

Finally, as a living museum, the mangrove forest is an ideal place to study the interaction of plants and animals with the environment. The presenters believed that every visit is an opportunity to understand that the forest helps to sustain the coastal and marine

environment for the survival of many organisms, including man. It stresses the awareness of communal protection and the preservation of our natural heritage.



LOCATION



Tabon Cave Complex At Present



- Erosion and siltation took place
- Growth of the mangrove forest
- Linking the Tabon Cave Complex to the mainland of Palawan

TABON CAVE COMPLEX 9,000 to 10,000 years ago



- Connected to the mainland of Palawan
- It was estimated that the shoreline was about 35 kilometers from the Tabon Cave

TABON CAVE COMPLEX



- 128 hectares of limestone formation and rugged cliffs;
- 218 caves and rock shelters;
- Diverse habitats with endemic flora and fauna;
- 38 caves used as habitation and burial sites in ancient times; and
- Archaeological finds dating back from 50,000 to 700 years ago

TABON CAVE COMPLEX 8,000 years ago



- At the end of the Ice Ages, the sea level rose to its present level
- The Tabon Cave Complex became an island

Aerial views of the Tabon Cave Complex



- Declared as a Site Museum Reservation pursuant to Presidential Proclamation No. 996
- As mandated by law, the National Museum is the administrator and is tasked to protect and preserve this reservation for the present and future generations

The Origin of the name TABON



Tabon bird is known as a local scrubfowl.
Scientific name:
Megapodius cumingii

Karst (Limestone) Forest

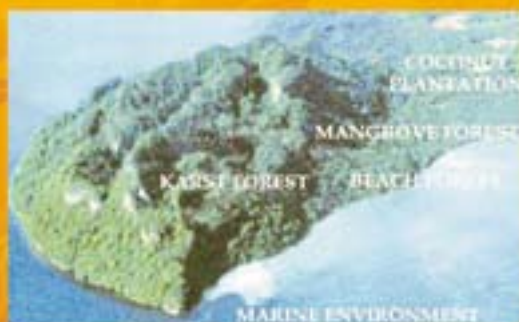


The Karst forest dominates the landscape of the complex.



Vegetation consists primarily of undersized trees because of the thin soil.

HABITATS OBSERVED



Animals



Diverse species of crabs.
Endemic birds like Palawan hornbill.
Two species of bats living in caves.

Marine Environment



Coral formation -- habitat of diverse species of fishes; dominant fish is the moorish idol.



Sea grass beds -- frequently visited by fishes and sea turtles.

Archaeological Resources



Dr. Robert Fox and the National Museum Team discovered archaeological sites that revealed 50,000 years of Philippine Prehistory.

Archaeological Resources



Flake tool

Tabon man skull cap

Manunggul burial jar

Site Development Projects

- Joint effort of various government agencies
- National Museum
- Department of Tourism
- Philippine Tourism Authority
- Local Government of Quezon, Palawan
- National Commission for Culture and the Arts
- Plans to develop the complex started in 1970
- Establishment of the National Museum Branch to better administer the site museum as well as to protect and preserve the resources
- Coordination with local government to impose local laws for the preservation of natural and cultural resources

Components of the Development Project

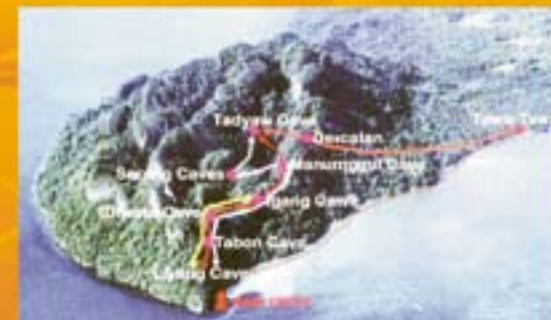
- Detailed Tourism Master Plan - framework of development projects
- Improvement of the exhibits
- Construction of comfort rooms and improvement of water sources
- Landscape of the ground of the branch museum
- Construction of the boardwalk leading to the caves
- Installation of signposts on the geology, flora, fauna and archaeological resources
- Restoration of the eco-tourism trails
- Tour Guide's Training for local community
- Publication of the guidebook
- Audi-visual documentary
- Local ordinance to protect the natural and cultural resources (buffer zones)
- Establishment of cooperatives of handicraft entrepreneurs and boat owners
- Development of the mangrove forest

Development of the Mangrove Forest into an Eco-Museum



- Mangrove forest connects the Tabon Cave Complex to the mainland of Palawan
- Serves as sanctuary for marine life and birds
- Protects the complex from strong waves
- Serves as a buffer zone that protects the cultural resources of the complex

Suggested Trails



Mangrove Eco-Museum



- Natural winding trail along the beach forest
- 175 meter boardwalk equipped with observatory platforms
- A living museum



Observatory platform in the interior of the mangrove forest, a living laboratory to observe the mangrove ecosystem



Installation of signage to create awareness on the communal protection and preservation of the mangrove forest

Standard Signage



Significant Information



Geological History of the area
Location of the mangrove eco-museum in the complex



Dominant plants
Dominant animals
Importance of mangrove ecosystem

Dominant Plants



Sonneratia alba
Rhizophora apiculata
Rhizophora mucronata
Bruguiera sp.



Marine Animals – Frequently Seen



Mollusks – 4 species
Crabs – 9 species
Hermit crabs – 4 species
Fishes -2 species

Frequently Seen Animals



Reptiles
Monitor lizard
Sea turtle

Frequently Seen Birds



Kingfishers – 2 species



White Bellied Sea Eagle

Frequently Seen Mammal



Long Tailed macaque

Importance of Mangrove Forest

- Protects the coastal areas by reducing damage caused by typhoon and strong winds
- Acts as buffer zone, protecting the sea grass beds and coral reefs
- Provides sanctuary to fishes and other marine organisms
- Source of timber, firewood, dye, tannin, charcoal, thatch, alcohol and medicine
- Recreational area for bird watching and observation of wildlife

Mangrove Forest in Danger

- Illegal cutting of trees
- Conversion of swamps into fishponds and prawn ponds
- Urban expansion
- If these practices continue, ecological stability that has been in existence for thousand of years will be destroyed and the environment might be endangered.

Mangrove Forest – Eco-Museum

- A living museum, the mangrove forest is an ideal place to study the interaction of plants and animals with the environment. Every visit is an opportunity to understand that the forest helps sustain the coastal and marine environment for the survival of many organisms including man
- Create awareness on communal protection and preservation of this natural heritage.

ACKNOWLEDGEMENT

- NATIONAL MUSEUM OF THE PHILIPPINES
- NATIONAL COMMISSION FOR CULTURE AND THE ARTS
- DEPARTMENT OF TOURISM
- LOCAL GOVERNMENT OF QUEZON, PALAWAN
- PACIFIC ASIA TRAVEL FOUNDATION

Education Programming in Muzium Negara

Janet Tee Siew Mooi,
Deputy Director,
Muzium Negara Kuala Lumpur

In another presentation from Malaysia, Ms Janet Tee Siew Mooi, Deputy Director, Muzium Negara Kuala Lumpur, touched on the role of eco-museum in education in her paper, 'Education Programming in Muzium Negara' (full presentation on page 77-84).

The presenter noted that the International Council of Museums (ICOM) defines a museum as a non-profit permanent institution in the service of society and of its development. The museum is open to the public, and its work consists in acquiring, conserving, researching, communicating, exhibiting for the educational and other related purposes, including those of giving enjoyment to the public and showing it the material evidence of people and their environment.

The motivation for setting museums comes from the need to establish educational institutions that can combine learning and enjoyment as well as expanded opportunities for leisure and tourism. As the speaker noted, people visit museums for various purposes – for recreation, that is, to enjoy free, relaxed and unstructured time and activity; and for sociability, meeting with or participating with others, in shared public activities. Their social class and educational backgrounds may of course be relevant to their decision to visit a museum, but in saying this we do not mean that museums belong to any particular class or group in society. It is open to all.



Janet Tee
Siew Mooi

The priorities of a museum once included collecting and preserving. Now, however, museums also serve to educate and entertain people. This changing role has to be implemented with necessary adjustments to meet the needs and requirements of the communities in which they are located. Greater services have to be introduced to meet the growing expectations of the visitors.

Education Programming has to determine the Target Audience. Though now museum educational activities often relate to children, adults also seek opportunities to learn with the families. Museums, indeed, can “*strengthen basic skills, basic knowledge, basic comprehension, and basic understanding*”.

Students are encouraged to say something about their interests and how they might respond to a particular situation or circumstance that has been carefully selected. This association with the students' immediate world will help them become less self-conscious and think in a predetermined direction.

The “Educational Programming Schedule” can be organized as a three-part initiative, as follows:

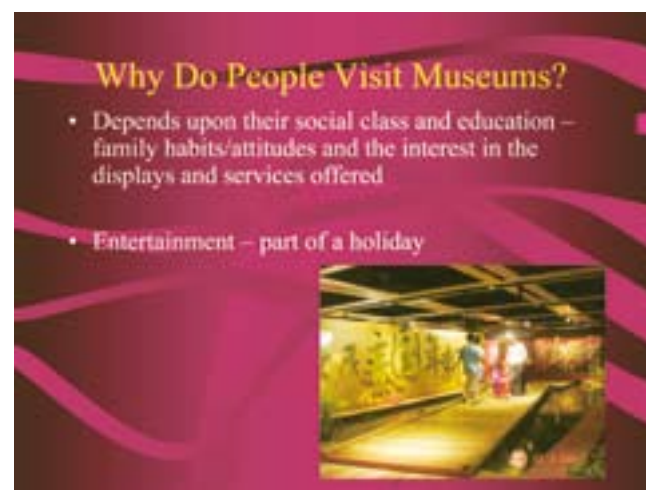
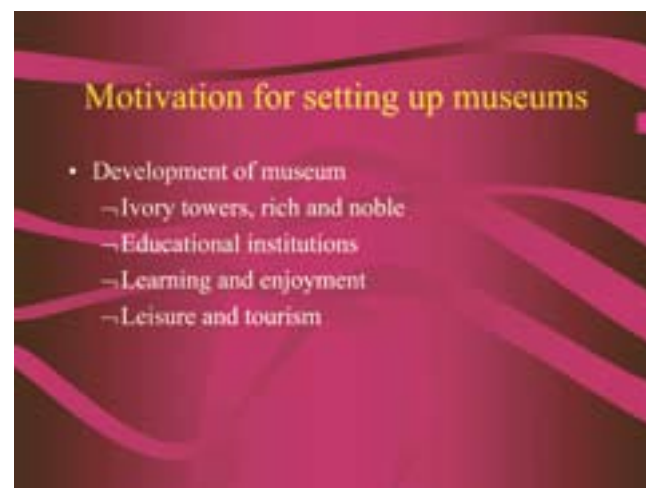
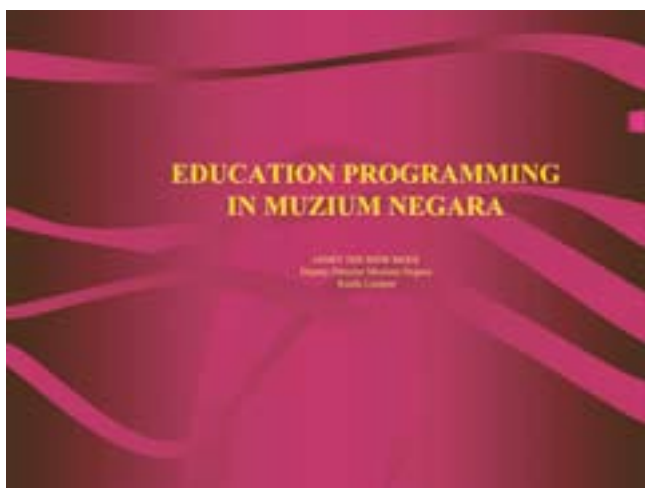
- **Planning:** This includes the tactics and sequence of activities organized to achieve the established goals. This process identifies who will do what, when and how.
- **Presenting:** This involves scheduling, which is an important factor in the educational process. Staff and volunteers must be available to present the programmes, and consideration must be given to the times and locations that will best accommodate the target group.
- **Evaluating:** Programme evaluation will provide the planners with an idea of whether the programme as presented corresponds with the planning objectives. This will also serve as a guide for

future development of the programmes of the same type.

Such education programmes include self-guided tours (with or without a volunteer) and guided tours (with a guide or pre-arranged script), hand-on activities (in the Discovery room) and direct involvement with making, touching or feeling. They can also involve organizing activities of interest to different age groups, fringe activities, temporary exhibitions (artefacts, performances, demonstrations, and dioramas).

There have been “Smart Partnership with the Media” (quiz and drawing competitions), “Sleep-over: A Night @ The Museum”, and “Behind the Scenes Tours”. Moreover, further museum interest can be generated through Free Admission Day (on International Museum Day, during Heritage Week, etc.) and Friends and Volunteers initiatives.

To close the presentation, the speaker highlighted the collaboration with other related agencies, which involve the Ministries of Culture, Arts and Heritage, Education, Tourism and Youth and Sports, and schools, NGO’s Senior Citizens Clubs, and embassies.



Why Do People Visit Museums?

- Recreation – Enjoyment of free, relaxed, unstructured time and activity
- Sociability – meeting with or participating with others, taking part in shared, public activities



Changing Role of A Museum

- From the traditional role of collecting and preserving, to the modern role of education and entertainment
- Museums are adjusting to meet the needs and requirements of the communities in which they are located
- Greater expectations from visitors have prompted museum personnel to provide greater services



Education Programming

- Education programming using collections carefully prepared and sensitively presented eg. determining the TARGET AUDIENCE or interest groups – information is presented in the vocabulary, comprehension level and social manner of the group.



Education Programming

- Museum educational activities often relate to children
- Adults seek opportunities to learn with the families



Museum As A Laboratory For Teaching / Enrichment

- The primary learning/teaching element of the museum is the object, unlike other educational institutions, the written or spoken word is the conveyor of information



Museum As A Laboratory For Teaching / Enrichment

- Unlike traditional academic environment, museums are open to individual exploration and because of their object-orientation, the learning process (self-paced learning) can be, and usually is, enjoyable



Museum As A Laboratory For Teaching / Enrichment

- Museums can "strengthen basic skills, basic knowledge, basic comprehension, and basic understanding."
- Museum educators should view school teachers as allies in the education process



Museum as a Transmitter of Information / Culture

- Students are encouraged to say something about their interests and how they might respond to a particular situation or circumstance that has been carefully selected. This association with the students' immediate world will help them become less self-conscious and think in a predetermined direction



Museum as a Transmitter of Information / Culture

- Students are requested to view objects or exhibits and described their feelings. In this way, the students learn both to observe the objects and to experience the process of gaining information through observation



Museum as a Transmitter of Information / Culture

- To connect the objects with the environment in which the students exist. By observation and discussion students learn that the objects they view in the museum relate in a very direct way to their daily life



S.W.O.T A. R. A.

- Strengths – real thing, popular appeal, architecture, multimedia terminal booth, interesting exhibitions, souvenirs, learning at your own pace
- Weaknesses – Limited collection, uninteresting exhibitions, poor venue, poor lighting & air-conditioning
- Opportunities – work with other organisation/museum/cultural institutions, educational opportunities, school holidays, advertisements
- Threats – bad weather, big sporting event, sale, school examinations, virtual museums

Educational Programming Schedule

- Plan – include the tactics and sequence of activities organised to achieved the established goals. This process identifies who will do what, when, and how
- Presentation – scheduling is an important factor in the educational process. Staff and volunteers must be available to present the programmes, and consideration must be given to the times and locations that will best accommodate the target group
- Evaluate – programme evaluation will provide the planners with an idea of whether the programme as presented corresponded with the planning objectives; it will also serve as a guide for future programmes of the same type

Education Programmes @ Muzium Negara

- Self-guided tours (with or without a volunteer)
- Guided tours (with a guide or prearranged script)



Education Programmes @ Muzium Negara

- Hands-on activities – Discovery room
- Direct involvement with making, touching or feeling



Education Programmes @ Muzium Negara

- Organizing activities of interest for various age groups
- Fringe activities
 - Trendy restaurant, café, museum shop



Education Programmes @ Muzium Negara

- Temporary Exhibition - Real thing (artifacts), performances, demonstrations and dioramas
- Interesting and exotic theme exhibition – home and abroad



Education Programmes @ Muzium Negara

- Exhibition Texts & write ups - user friendly, Bahasa Malaysia/English/Mandarin. Recommended: Special text panel for children and handicapped, Braille for the blind
- Smart Partnership with the Media – quiz, drawing competitions



Education Programmes @ Muzium Negara

- Sleepover : A Night @ the Museum
- Familiarization tours / Behind the Scene Tours, to the collection of museum, facilities and sites.



Creating Museum Interest

- Free Admission Day: International Museum Day 18 May – ICOM; Heritage Week – July, Ministry of Culture, Arts, and Heritage; World Tourism Day
- Free handout, gallery guide, brochures and leaflets.
- Friends and volunteers : Source of voluntary expertise in research, creative and professional work, assist in the museums' educational and public programmes, fund raising, etc.

Collaborating with other related agencies

- Ministry of Culture, Arts and Heritage
- Ministry of Education
- Ministry of Tourism
- Ministry of Youth and Sports
- Schools/international schools
- Institutions of Higher Learning
- NGOs
- Community Centre/Rukun Tetangga
- Senior Citizen Clubs
- Under Privileged Communities
- Travel agencies, Taxi drivers, tour guides, hotels
- Embassies

"Every museum has an educational responsibility to the public it serves. Museums offer a unique encounter with objects and ideas for people of many ages, interests, capabilities and backgrounds. Museum education strengthens that encounter by building bridges between visitors' experiences and expectations and the experiences and ideas that originate from a museum's collections."

Gary Edgren & David Dean

Coastal Community in the Kingdom of Cambodia

(A Case Study on Mangrove Management)

Ouk Vibol,
Deputy Director of
Conservation Division, Fisheries
Administration, Ministry of
Agriculture, Forestry and Fisheries
Cambodia



Ouk Vibol

Mr Ouk Vibol, Deputy Director of Conservation Division, Ministry of Agriculture, Cambodia presented 'Coastal Community in the Kingdom of Cambodia (A Case Study on Mangrove Management)' (full presentation on page 89-97).

General Introduction

Cambodia covers an area of 181,035 square kilometres. It is classified as country-rich in natural resources and considered a "water-wealthy" country. Its total fish production ranges from 279,000 to 441,000 tons from inland water and 35,000 to 45,000 tons from marine water. Before 1960, the forest area covered more than 70 per cent of its land surface, and it is estimated that in 1997, 10.6 million remained in the country.

Cambodia's total population (2005 estimate) is 13.7 million. Over 84 per cent of the people live in rural areas, and 85 per cent of them depend directly on natural resources. The country's coastline extends over 435 kilometres from the Thai border in the north to the Vietnamese border to the south.

Coastal Resources and Legal Framework

The total stock of marine fin fish during the 1980's was estimated at 50,000 metric tons. 435 species of the fish stock remain in existence. Mangrove forest, coral reef, and sea grass habitats are some of the most biologically rich and economically valuable ecosystems. The paper explained that the "Law of the Fishery" states that all these mangrove, coral reef and sea grass habitats are classified as protected conservation areas.

Threats to Mangrove Forest and Resolution

The presenter indicated that the most urgent threats to the mangrove forests in Cambodia are numerous. These include:

- Charcoal production
- Land encroachments
- Illegal logging
- Urbanization
- Coastal development
- Salt farming
- Intensive shrimp farming

Concept of Community-based Natural Resource Management (CBNRM)

There is action to manage the mangrove forest through increased public awareness and community-based initiatives such as the Community-based Natural Resource Management (CBRM).

There are day-to-day watches conducted by fishery officials, community members and local authorities. Mangrove areas have been demarcated, and illegal encroachments on these areas have been confiscated. About 1,023 hectares have already been confiscated. At the same time, to replenish the mangrove, replanting of the mangrove has been recommended.

Mr. Vibol described that in the Cambodian context, CBRM is defined as "a diversity of co-management

approach that strives to empower local communities to actively participate in the conservation and sustainable management of natural resources". This measure is needed in Cambodia because the resource stocks and environmental quality have become degraded, while biodiversity and the ecosystem are resources that urgently need protection.

The goal of CBRM can be divided into two categories: community empowerment goals and ecosystem conservation goals. Each category of the CBRM goals covers the following issues and themes:

Community empowerment goals include:

- Poverty reduction
- Social justice/equity
- Improvement of livelihoods
- Viable economic income
- Respect for local/traditional ecological knowledge
- Community organization and local network.

Ecosystem conservation goals include:

- Ecosystem services conserved
- Hydrological cycle
- Water quality
- Soil, forests, wildlife
- Habitats
- Sustainability.

Guidelines for Coastal Community Establishment

The coastal community in Cambodia can be established in mangrove, coral reef, and sea grass areas, where water depth is less than 20 metres. Mr. Vibol explained that 40 coastal community fisheries have been established so far. By-law and regulations on the establishment of coastal communities cover the following details:

- Name of the community and its objectives
- Community membership

- Management of the community's incomes and expenses
- Community committee arrangement
- Community committee election
- Community meeting arrangement
- Termination of the community
- By-law revision procedure.

Opportunities and Challenges

The development of coastal communities is a highly challenging project. However, a successful resource management-oriented coastal community requires many conditions. These include:

- A sustainable policy and legal framework
- Good governance and decentralization
- Conflict resolution mechanisms
- Attention to gender and equity issues
- Information-flow management (cooperation, networking, and knowledge sharing)
- Enforcement
- Monitoring and reflective learning analysis
- Sustainable livelihood.

Participatory Management of Mangrove Resources in Peam Krasaop Wildlife Sanctuary: A Case Study

Comprising three districts, six communes, and 12 villages, the Peam Krasaop area has a population of about 10,000 people. It was declared by a royal decree as Wildlife Sanctuary on 1 November 1993. Its mangrove swamp, which covers an area of 10,000 hectares, has 34 species of birds and a rich biodiversity of fish, crabs, snails, turtles, dugongs, and dolphins. The aims of organizing this coastal community are as follows:

- To solve conflicts in the area
- To find a way of raising the incomes of the people
- To strengthen local awareness of importance of coastal resource management

- To enhance the natural environment.

As expressed during the presentation, the case study has confirmed that there are both challenges and benefits of coastal community organization. The challenges relating to this resource management initiative include its political aspect, the problem of transparency, the lack of communication and involvement of the relevant institutions, poor knowledge and poverty, and the lack of funding. However, the project has also proved that the benefits to be gained should outweigh the problems it has encountered:

- Most local people understand the significance of the mangrove forest.
- The coastal environment has improved.
- The general incomes of the people in the community have been improved.
- Illegal fishing activities have been reduced.
- Mangrove logging and encroachment have stopped.
- 70 hectares of mangrove forest have been replanted.



General Introduction

- Cambodia covers an area of 181,035 sq. kilometres, and is rich in natural resources.
- Total fish production ranges from 279,000 to 441,000 tons from inland water and 35,000-45,000 tons from marine water (DoF, 2000).
- Before 1960, forest covered more than 70% of the country's land surface.
- Cambodia's total population in 2005 is 13.7 million with over 84% living in rural areas, 83% of which depend directly on natural resources.
- Coastline Thai border Vietnam

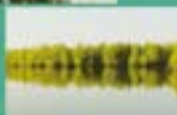
Natural Resources



Land cover Category	Forest Total (ha)	% of Forest Total	Water Protected Area (ha)	% of Total Water Protected Area
Agricultural production	56,304	45.5	3,385	4.8
Evergreen, deciduous, and semi-deciduous forest	42,088	33.7	18,317	40.9
Plantation forest and woodland	40,312	32.3	12,898	27.2
Shrub forest and forest	14,002	11.3	8,820	11.7
Seasonally inundated forest, wetland, and open area	7,728	6.2	3,588	8.8
Wetland, scrubland, or bamboo forest	7,623	6.1	5,709	7.6
Grassland and meadow	6,490	5.2	1,216	2.6
Open water	5,093	4.1	2,629	6.7
Mangrove forest (1995)	649	0.5	425	0.9
Rock forest or forest	365	0.3	18	0.0
Other	300	0.2	300	0.6
Build-up areas, urban infrastructure	101	0.1	6	0.0
Total Total	124,876	100	67,381	53.9

Coastal Resources

- Data estimated that the total stock of marine fin fish found between 1982-86 is 30,000 metric tons.
- Marine species: 435 species
- Mangrove forest, coral reef and seagrass habitats are some of the most biologically rich and economically valuable ecosystems.
 - Total mangrove forest area covered 84,400 ha (169 species) only.
 - Total area of coral is 7,800 ha, and includes 70 species of coral in 33 genera and 11 families.
 - Total area of seagrass is 82,002 ha, consists of 10 species.
- Under Fisheries Law, mangrove, coral reef and seagrass areas are classified as protected and conservation areas.



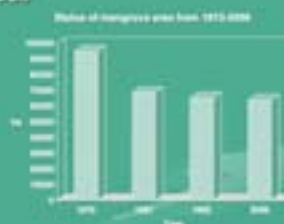
Particular case of the mangrove forest resources



Mangrove forest resources

- Threats to mangrove areas

- chemical production
- land encroachment
- illegal logging
- urbanization
- coastal development
- salt farming
- intensive shrimp farming



Mangrove forest resources

- Action to manage mangrove forest
 - Increase public awareness
 - Community-based Natural Resource Management
 - Day to day monitoring by fishery officials, community members, and local authorities
 - Delineation of mangrove area boundary
 - Measure against illegal encroachment
 - 1,023 ha were confiscated
 - Replantation of mangrove forest
 - 7,200 ha of mangrove area were replanted
 - 150 ha in plan



Concept of Community-based Natural Resource Management (CBNRM)

- Why CBNRM is needed in Cambodia?
 - the resource stocks and environmental quality degraded due to centralized management system to effectively protect biodiversity and the ecosystem
- What is community?
 - a special group of people interested in collaboration with the support of NGO or government agency programmes.
- Definition of CBNRM (in context of Cambodia)
 - A diversity of co-management approaches that strive to empower local communities to actively participate in the conservation and sustainable management of natural resources

Concept of Community-based Natural Resource Management (CBNRM) (cont.)

Goal of CBNRM in Cambodia divided into two categories

- | | |
|---|--|
| <ul style="list-style-type: none"> Community empowerment goals <ul style="list-style-type: none"> Reduce poverty Social Justice/Equity Improve livelihoods Viable economic income Respect for local traditional ecological knowledge Community organization and local network | <ul style="list-style-type: none"> Ecosystem conservation goals <ul style="list-style-type: none"> Ecosystem services Hydrological cycle Water quality Soil, forests, wildlife Habitats Sustainability |
|---|--|

Guideline for coastal community establishment in Cambodia

- Coastal community in Cambodia can be established in the critical areas such as coral reef, seagrass, mangrove where water depth is less than 20 m.
- So far, 40 coastal community fisheries and natural resources have been established
- Nine basic steps are adopted for coastal community establishment:



By-law and Regulation Preparation

- Name of community and objectives
- Membership
- Management of income and expense
- Community committee arrangement
- Community committee election
- Committee meeting arrangement
- Procedure of revising by-laws

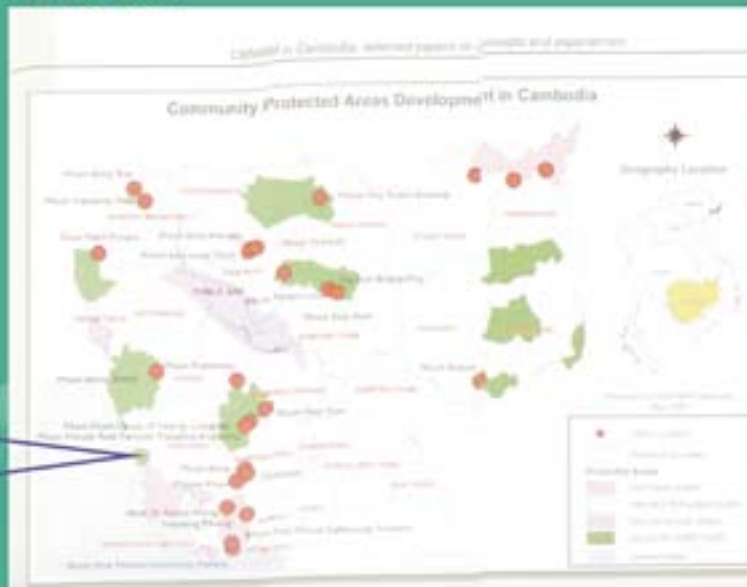
Opportunities and Challenges

- Successful coastal community-based resource management requires:
 - sustainable policies and a legal framework
 - good governance and decentralization
 - conflict resolution mechanism
 - gender and equity issue
 - information flow management (cooperation, networking, and knowledge sharing)
 - enforcement
 - monitoring and reflective learning analysis
 - sustainable livelihood



Case study of the Participatory Management of Mangrove Resources (PMMR) (in Peam Krasaop Wildlife Sanctuary)

Background of the area



Case study of the PMMR

- Background of the area
 - Declared by Royal Decree as Wildlife Sanctuary on 1 November 1993, covers an area of 23,730 ha
 - Composed of 3 districts, 6 communes and 12 villages
 - Population: 10,000 people
 - Mangrove swamp: 10,000 ha and 64 species (largest area of mangrove)
 - Scrubland: 1,000 ha and 6 species
 - Water bird: 24 species
 - Rich in biodiversity: fish, crabs, snails, turtles, dolphins and dolphins
 - Only three villages are located close to the mangrove swamp
- More people migrate to the area during 1980-1990 for charcoal production, fishing and shrimp pond culture
- In 1999, the government banned charcoal production, resulting in the change of the inhabitants' occupation to fishing and shrimp culture, which increased pressure on mangrove swamp and resources
- High potential for eco-tourism

Case study of the PMMR

- Aims of community in the area
 - To solve conflicts,
 - To find a way to improve the income of the people
 - To strengthen local awareness and
 - To enhance the natural environment



Case study of the PMMR

The evolving management structure of PMMR



Case study of the PMMR

How Village Communities are Formed

- With PMMR project facilitation
 - Provided training and study tours for the locals to understand the significance of mangrove and coastal resources as well as CBNRM concepts
 - Established a core group of village chief, village elders, school teachers and other individuals (10 members)
 - Collected resource information and drafted map of community boundary
 - Drafted by-laws with core group
 - Elected village community committee
 - Registration
 - Prepared workplan

Case study of the PMMR

STRUCTURE OF VILLAGE COMMITTEE



1. Protection /prevention and monitoring
2. Mangrove replanting
3. Promotion of livelihood option
4. Community "Order"
5. Supply of drinking water
6. Waste management
7. Public awareness
8. Research and create protected areas
9. Eco-tourism

Case study of the PMMR

Challenges of resource management

- Political issues
- Transparency
- Lack of communication
- Lack of involvement from the relevant institutions
- Poor knowledge and poverty
- Lack of funding

Case study of the PMMR

Benefits

- More local people understand the significance of the mangrove forest and coastal habitats
- Improvement of coastal environment
- Generation of income
- Reduction of illegal fishing activities
- Prevention of mangrove logging and encroachment
- 70 ha of mangrove forest replanted



Water Culture and the Community – Raising Environmental Awareness

Koh Lee Chew (Ngee Ann Polytechnic),
Lim Han She (National University of Singapore), and
Shawn Lum (National Institute of Education)

In the presentation, ‘Water Culture and the Community – Raising Environmental Awareness’, Singapore’s delegates discussed the efforts to increase awareness of environmental issues in Singapore (full presentation on page 103-118).

To start the presentation, the speakers cited that as a city-state, Singapore is an island nation of almost 700 km² sandwiched between Johor, Malaysia, and Riau, Indonesia. Serving as an important transport, shipping, trading, and manufacturing hub, the city-state is economically vibrant. It is also known for its cleanliness and celebrated for its efficiency.

As an island nation, Singapore has important connections with water. Historical and present-day water connections include:

- Raffles landing spot
- Port and associated industries
- Fishing and coastal communities
- Love for seafood (and famous for such restaurants)
- Rivers/estuaries with transport and entertainment utilities
- Domestic and industrial use of water
- Land reclamation as a result of landfill for waste.



Top: Koh Lee Chew;
Middle: Lim Han She;
Bottom: Shawn Lum

Despite such close and multivariate connections with water, the speakers remarked that Singapore does not have a self-sufficient supply of water. It has various water bodies, including canals (7,000 km), reservoirs (14), rivers (32), and the coastline. Its main reservoirs include the MacRitchie – the first central reservoir – and the Upper Seletar reservoir. Additional reservoirs also exist, which have been formed by damming estuaries.

Still other connections with water can be found. The Labrador Nature Reserve is a coastal nature area, and at the Sg Buloh Wetlands Reserve, mangroves still exist. Moreover, Bishan Park combines natural scenery with lakes, while in the busy centre of the island state, Gardens by the Bay and Marina Bay Reservoir can be found. At Sentosa, Singapore’s island resort, Underwater World offers a marine environment in a fun and educational way.

What are Singapore’s efforts at raising an awareness of water?

“National Policy and Implementation” includes the “Four Taps of Singapore”. These are wastewater reclamation, desalination of seawater, import from Malaysia, and reservoirs. Many other projects and activities have also been put into effect, including no littering, a Save Water Campaign, Grassroots (an ABC Waters programme), educational programmes, and passion to preserve the environment.

ABC Waters stands for Active, Beautiful, Clean Waters. Tan Nguan Sen, the director in charge of this project, has explained its purpose as follows: “In the last two years, we have been trying to bring people nearer to water through the introduction of water activities at reservoirs, such as kayaking, rowing, fishing and so on. Under the ABC Waters programme we will bring the water to the people by exploring the potential of our water bodies throughout the island”. This ABC scheme also involves:

- Landscaping of river banks
- Lookout areas that extend into the river
- Creation of streams and pools by drawing water from canals
- Water stage for outdoor performance.

There are ABC plans for a number of different areas including Sungei Tampines, Sungei Punggol, and Pang Sua Canal.

As mentioned in the presentation, new reservoirs are expected to be constructed by 2009. At Sungei Serangoon, there will be a floating wetland, links to the mainland by a suspension bridge and a floating boardwalk; while at Sungei Punggol, a wetland will be constructed at the edge of the reservoir covering an area of 11 hectares.

A useful comparison of the vegetation of Singapore in 1819 was made with that of the 1990's. The comparison was based upon the case study of Sungei Buloh Wetland Reserve. Covering an area of 87 hectares, the site, which was gazetted in 1989, is of importance for migratory birds.

To enhance the passion to preserve the environment, numerous school activities have been initiated. These include:

- Coastal cleanup
- Paintings at shelters along the boardwalk
- Students trained to work at stations to give information or as guides
- Adoption by schools of a particular environment
- Preparation by schools of educational materials
- Reforestation.

One direct scheme implemented at secondary schools is the "Reforestation and Reach Out Project". Under this project, schools in Singapore are directly involved in the conservation of nature. The purpose is for them to do their part in this vital environmental task, which also includes a revamp of outdoor classroom and surrounding

areas through reforestation and development of educational materials and websites. Funding could be acquired from HSBC, Toyota, Shell, and National Parks.

At Ngee Ann Polytechnic, for example, students, in pursuing their educational programmes, are provided with an opportunity to appreciate the scarce natural habitat in Singapore, which is an urban society. One example was the study of a "Rocky Seashore Biodiversity" at Labrador Park located southwest of Singapore. Part of the students' work here consisted in compiling "Examples of Classification and Taxonomy of Seashore Creatures".

The paper commented that there are promising signs that a concern for aquatic environments is growing in Singapore. Is this a possible outcome of a water culture? Young, dynamic environment-conscious groups, such as the Blue Water Volunteers, have been active in enhancing concern for water and marine conservation and awareness. An outpouring of public concern for Pulau Ubin, Tanjong Chek Jawa, led to postponement of reclamation. Instead, visitor facilities are now under construction.

As part of water culture and environment, school children learn about the environment and its conservation. They are taught the importance of water (and the need to conserve it). For example, students learn about pollution, the need to recycle, and the importance of conserving water. A learning programme of this type can be seen from Singapore primary science syllabus:

"At the social level, the interaction of Man with the environment drives the development of Science and Technology. At the same time, Science and Technology influences the way Man interacts with his environment. By studying the interaction between Man and his environment, pupils can better appreciate the consequences of their actions".

The primary six science syllabus asks students to identify factors that affect the survival of an organism,

including the physical characteristics of the environment, availability of food, types of other organisms present. In this way, it is hoped that pupils should appreciate and have a respect for living things and the environment. Also, examples have to be given of man's impact (both positive and negative) on the environment.

In determining to what extent does Singapore have a “water culture”, can an analogue be found in Singaporean attitudes to Nature Reserves and recreation?

Bikit Timah Nature Reserve is the largest remnant patch of primary forest remaining in Singapore. The Kayu Gelam (*melaleuca cajuputi*), a native of swamps, lends its name to a historic part of the town – Kampong Gelam. Telok Kurau, an area in great demand for housing comes from “Ikan Kurau”, or “Threadfin” which prompts the questions: How many students knew the origin of the place name?

Tanjong Katong has seen a dramatic change in landscape over the past century. This has resulted in a disconnection with our past – and hence a disconnection with water? How strong is the linkage between lifestyle, sustainable development, and nature and water conservation – indeed, how great is the gap between awareness and action?

In conclusion, the presenters stressed that “Water Culture” was expressed with these views:

- Better to have one than not to have one
- Having a water culture is no guarantee of wise stewardship of water resources and habitats
- It should lead to a desire to learn more about water
- In today's world, this should lead to more holistic thinking about water (e.g., our impacts on water elsewhere)
- It should lead to positive outcomes
- It should constitute more than knowledge – there must be an emotional/spiritual/cultural link as well

- It should connect people to a place and one's past (and future?)
- It should connect generations to each other.

Water Culture & The Community – Raising Environmental Awareness

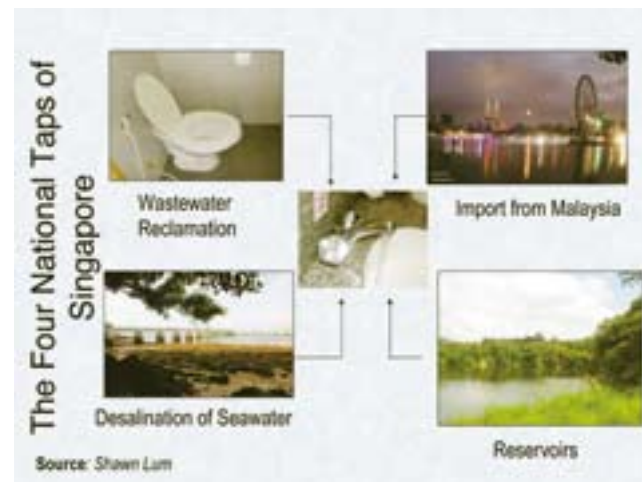
Koh Lee Chew (Ngee Ann Polytechnic)
Lim Han She (National Univ of Singapore)
Shawn Lum (National Inst. of Education)

Singapore is....

- An island nation of almost 700 km²
- Sandwiched between Johor, Malaysia and Riau, Indonesia
- Economically vibrant - transport, shipping, trading, manufacturing hub
- Known for cleanliness
- Celebrated for its efficiency
- Has an important connections to water

Singapore....

- Has important historical and present-day connections to water
 - Raffles landing spot - a mangrove area
 - Port and associated industries
 - Fishing and coastal communities
 - Love for seafood (and famous for such restaurants)
 - Rivers/Estuaries - transport/entertainment
 - Water for domestic and industrial use
 - Only landfill for waste is reclaimed from the sea
- But Singapore is not self sufficient for water



Active, Beautiful, Clean Waters (ABC Waters for short)

"In the last two years, we have been trying to bring people *nearer to water* through the *introduction of water activities at reservoirs*, such as kayaking, rowing, fishing and so on. Under the ABC Waters programme, we will bring the water to the people by exploiting the potential of our waterbodies throughout the island," said Tan Nguan Sen, the director in charge of this project.

Source : http://www.pub.gov.sg/info_center/press_release/30072007.aspx

Singapore's link to water: Work and Play

Gardens by the Bay and the Marina Bay Reservoir
<http://www.marine-bay.sg/development.html>

Singapore's Link to Water: Entertainment (and \$\$\$)



Source: <http://www.underwaterworld.com.sg/>

What are Singapore's Efforts at Raising an Awareness of Water?

Context

- National Policy and Implementation
 - Four National Taps of Singapore
 - Law – No littering Fine \$500/- or \$1000/- (Depends on where you are in Singapore)
 - Save Water Campaign
 - Grassroots (ABCs Waters programme)
 - Education
 - Passion to preserve our environment?

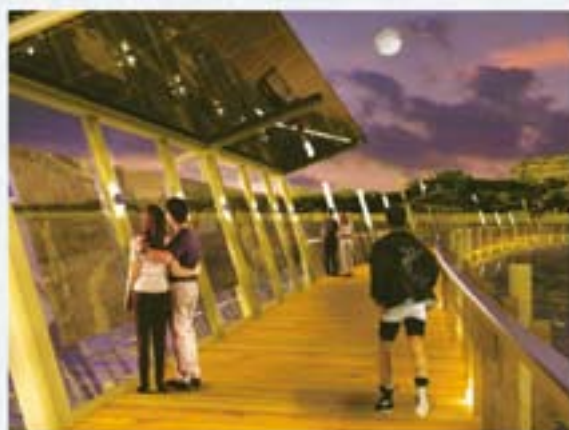
Active, Beautiful, Clean Waters

- Landscaping of river banks
- Lookout areas that extend out into the river.
- Creation of streams and pools by drawing water from canals.
- Water stage for outdoor performance.

The River Trail along the Rochor Canal



Source: http://www.pub.gov.sg/info_center/press_release/30072007.aspx



Source: http://www.pub.gov.sg/info_center/press_release06022007.aspx



Source: <http://www.pub.gov.sg/Marina/index.htm>

The Blue Map of Singapore



Source : PUB press release dated 6 February 2007, Annex A
http://www.pub.gov.sg/info_center/press_release06022007.aspx

New reservoirs (by 2009)

1. Sungei Serangoon

A floating wetland.

Linked to the mainland by suspension bridge and floating boardwalk.

2. Sungei Punggol

Wetland to be constructed at the edge of the reservoir (11 hectares).



Source of map/Map is available on the website <http://www.singapore.gov.sg/land/landuse/landuse.htm>
Taken from the book titled From "A Guide to Mangroves of Singapore", Peter K. L. Ng and N. Sheehi (editors)
Volume 1: The Ecosystem and Plant Diversity and Volume 2: Animal Diversity
Authors: Koon K. P. Lim, Dennis H. Murphy, T. Mengers, N. Sheehi, Peter K. L. Ng, B. C. Soong, Hugh T. W. Tan, K. S. Tan & T. A. Tan



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Example:

Reforestation and Reach Out Project

Objectives

To involve schools in Singapore to do their part for nature conservation.

To revamp outdoor classroom and the surrounding areas through reforestation and development of educational materials and websites.





Funding?

1. HSBC
2. Toyota
3. Shell
4. National Parks

Education - Ngee Ann Polytechnic

OBJ: Through education, students appreciate the scarce natural habitat in Singapore, an urban society.

Study of a Rocky Seashore Biodiversity at Labrador Park located S-W of S'pore



Examples of Students' project work..... The next 4 slides...

Photos: Mr. Koh Lee Chew

Examples of Classification and Taxonomy

Purple Sponges

Kingdom:	Animalia
Phylum:	Porifera
Class:	Demospongiae



Photo: Mr. Koh Lee Chew

Interesting facts:

- Demospongiae are the largest class of the phylum Porifera

- Primitive, sessile, mostly marine, water-dwelling filter-feeders (i.e. pump water through bodies to filter out food particles)

- 5000 modern species known

- Can be found attached to surfaces anywhere from the intertidal zone to depths > or = 8500 m

Students' project work

Identification of Seashore creatures



Sargassum
weed or
Brown algae



Sea grape



Slender red
sea weed



Sea lettuce



No clue....?
(Halimeda)



Feathery sea
weed

Students' project work
Photos: Mr. Koh Lee Chew



Brittle worms



Gastropods



Sea-shore slug

....Continue- Identification of sea-shore creatures



Fish



Snapping shrimp



Sponge

Students' project work
Photos: Mr. Koh Lee Chew

**BEWARE..... No collection of
souvenirs!**



Students' project work
Photos: Mr. Koh Lee Chew

Education - more from Ngee Ann Polytechnic

OBJ: Through education, students appreciate the agricultural
produce imported from our neighbors; and it is a lot of **HARD
WORK !**

Identifying fruit trees in Pulau Ubin, located N-E of S'pore



Our heritage. One of the few !!!



View of Pulau Ubin

Examples of Students' project work..... The next 2 slide....

Photos: Mr. Koh Lee Chew



Mini guava



Cactus.....? Where
is the dragon fruit



Can you spot the
fruit?

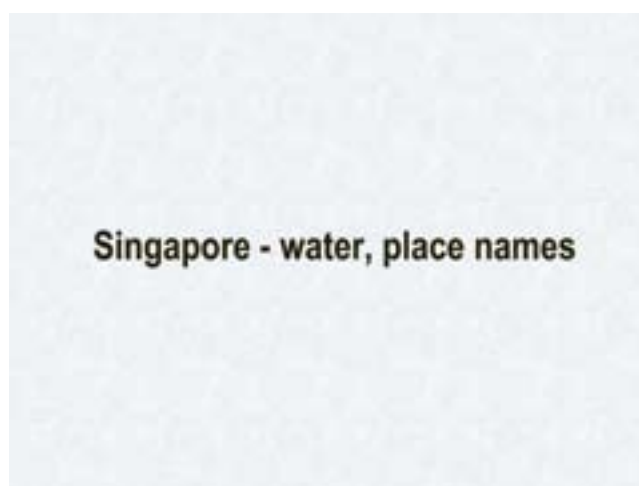
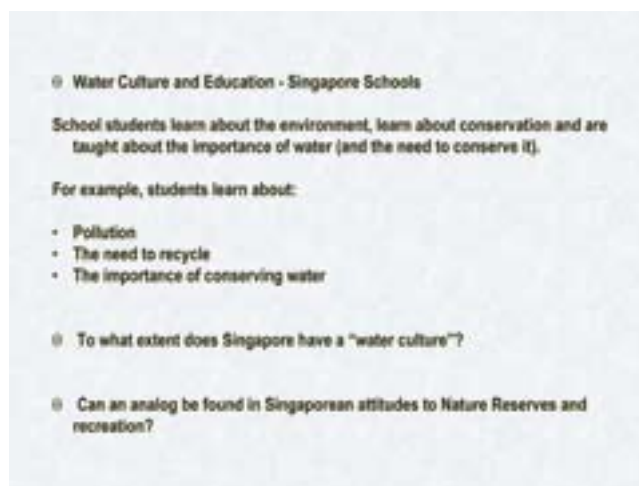


Custard
apples
and limes
having a
discussion



"Are you
going
bananas
already?"

Students' project work
Photos: Mr. Koh Lee Chew



"Di Tanjung Katong" - a song nearly all children learn in school



Map:
http://www.streetdirectory.com/asia/singapore/transport/tanjungkatong_id_217723.html

A disconnect with our past; a disconnect with water?



Tanjung Katong, c. 1900

"Di Tanjung Katong..."

"At Tanjung Katong..."

"...Airnya biru..."

"...With its waters of blue..."

"...Di situ tempat..."

"...There..."

Singapore: how strong is the linkage between lifestyle, sustainable development, and nature and water conservation - how great is the gap between awareness and action?

Tanjung Katong - a dramatic change in landscape



Our views on water culture:

- Better to have one than not to have one
- Having a water culture is no guarantee of wise stewardship of water resources and habitats
- It should lead to a desire to learn more about water
- In today's world, should lead to more holistic thinking about water (e.g. our impacts on water elsewhere)
- Should lead to positive outcomes
- Constitutes more than knowledge - there must be an emotional/spiritual/cultural link as well
- Should connect people to a place and one's past (and future?)
- Should connect generations to each other

What is a "Water Culture"?

(What are the characteristics of a society that has a "Water Culture"?)

Based on what we have presented - and what we have discussed about what a Water Culture is - to what extent does Singapore have a "water culture"?

How unique to Singapore are these issues?

i.e. is Singapore's situation primarily due to the fact that it is an urban society?

What aspects of a "Water Culture" do you find in your own country or place of residence/work?

Nature Centres for Wetland Conservation in Malaysia

Noor Azlin Yahya, Chong Mew Im and Azyyati Abd. Kadir, Ecotourism and Urban Forestry Programme, Forestry Research Institute Malaysia (FRIM)



Noor Azlin Yahya

In the presentation, 'Nature Centres for Wetland Conservation in Malaysia', (full presentation on page 121 - 131) Noor Azlin Yahya, Chong Mew Im and Azyyati Abd. Kadir began by stressing that Malaysia is home to various types of wetlands. These include the coastal wetland – mangroves and nypa; inland wetland; natural wetlands, for example, marshes, lakes, rivers, flood plains and peat swamps; and man-made or artificial wetlands, e.g., rice fields, dams, and reservoirs. Wetland conservation has been undertaken by the government agencies, NGO's, as well as private organizations. Wetland conservation projects include:

- Government projects: for instance, FRIM-UNDP project and Forestry Department projects (Loagan Bunut, Kilas Nenasi)
- NGO projects: e.g., Malaysian Nature Society and WWF Malaysia (Terengganu and Kuala Selangor)
- Private organizations' projects, such as Perwira Bintang (Sg Besar).

Malaysia's mangroves have received the conservation efforts of government forest departments, the private sector (Perwira Bintang), as well as NGOs MNS & WWF. Other sites include Kota Kinabalu City (Bird Sanctuary) and Kuala Selangor Nature Park.

It was explained by the presenters that environmental interpretation serves as a very important management tool to convey the message for sustainable forest management, for example, in the form Recreation Forests. Moreover, wetland tourism, consisting of village communities; tourism with an emphasis on education; fireflies, birds, and other wildlife watching; and floating restaurants, has also received growing attention.

The Forest Research Institute in Malaysia (FRIM) receives various types of visitors. Members of the general public constitute 70 per cent of its visitors, while 24 per cent are students and 6 per cent are foreign tourists. All through its history, trees have been annually planted, and it has surveyed the number planted between 1927 and 1960.

Today, FRIM operates within forested grounds, explained the presenters. It has established enough to support the different types of habitat required by a diversity of wildlife, including the wetland dependent amphibians, such as tree frogs that need specific niches as their dwellings near the tree canopies.

In the “River Corridor” (Sg Kroh in FRIM), various species of flora can be found, including the Jelutong (*Dyera constulata*), Sentang (*Azadirachta excelsa*), and Teak (*Tectona grandis*).

Wetland Interpretation activities also involve class outings from schools. Birds spotted during these Interpretation activities include kingfishers, Gold-whiskered Barbets, Crested Serpent Eagles, Greater Racket-tailed drongo, and yellow Bitterns. Moreover, there are Monitor Lizards (*Varanus sp*), insects and wetland plants in adaptation.

Another type of activity is the Nature Interpretation Camp, for which the theme “Treasures of Wetland” has been adopted. The activity is undertaken with an Interpretation Kit that is used to conduct an environmental education programme relating to freshwater wetland.

The presenters underscored that still many other types of activities are already in existence, such as Nature games, Traditional games, and arts and crafts including origami.

NATURE CENTERS FOR WETLAND CONSERVATION IN MALAYSIA

Noor Azlin Yahya,
Chong Mew Im & Azyyati Abd. Kadir
Ecotourism and Urban Forestry Programme,
Forest Research Institute Malaysia (FRIM), Kepong, 52109

MALAYSIA: BACKGROUND INFORMATION

Area: 329,758 km²

- Peninsular Malaysia
- Sabah and Sarawak and the Federal Territory of Labuan in the north-western coastal area of Borneo Island.
- Peninsular Malaysia borders with Thailand and Singapore

Population: 27 million

State	Total
Johor	1,058,113
Kedah	908,388
Kelantan	430,343
Malaka	907,971
Negeri Sembilan	955,398
Pahang	917,184
Perak	1,183,330
Perlis	66,368
Putrajaya	879,171
Sabah	1,186,900
Sarawak	964,288
Terengganu	434,888
Selangor	3,485,878
F. T. Kuala Lumpur	1,305,792
F. T. Labuan	34,752

Kuala Lumpur

MALAYSIA: TYPES OF WETLANDS

Coastal wetland – mangroves & nypa

Inland wetland

- Natural wetlands e.g. marshes, lakes, rivers, flood plains and peat swamps
- Man-made or artificial wetlands e.g. rice fields, dams and reservoirs.



WETLAND CONSERVATION

GOVERNMENT e.g. FRIM-UNDP project, Forestry Department (Loagan Bunut, Kias & Nohai)

NGOs e.g. Malaysian Nature Society and WWF Malaysia (Terengganu & Kuala Selangor)

Private organisations e.g. Perwira Bintang (Sg. Besar)



MALAYSIA: WETLAND TOURISM



MALAYSIA: WETLAND TOURISM

Village communities

Educational Tourism

Study of fireflies, birds and other wildlife

Floating restaurants



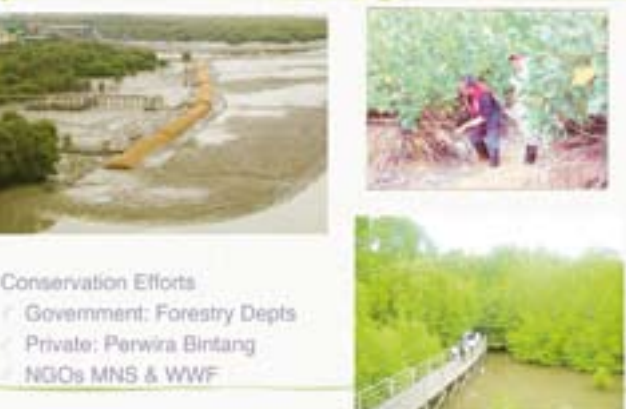
MALAYSIA: MANGROVES

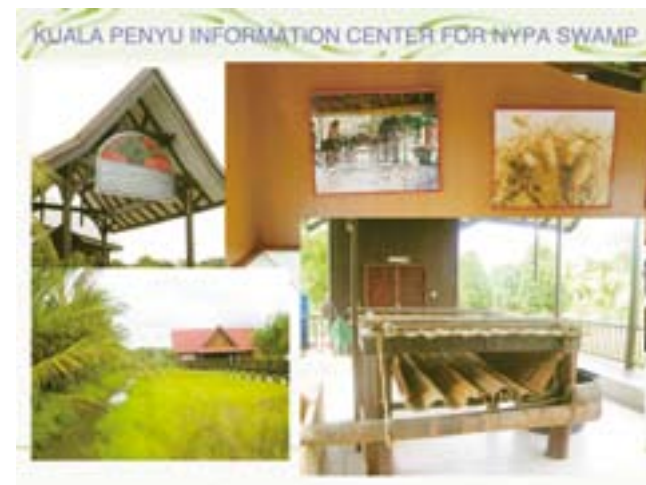


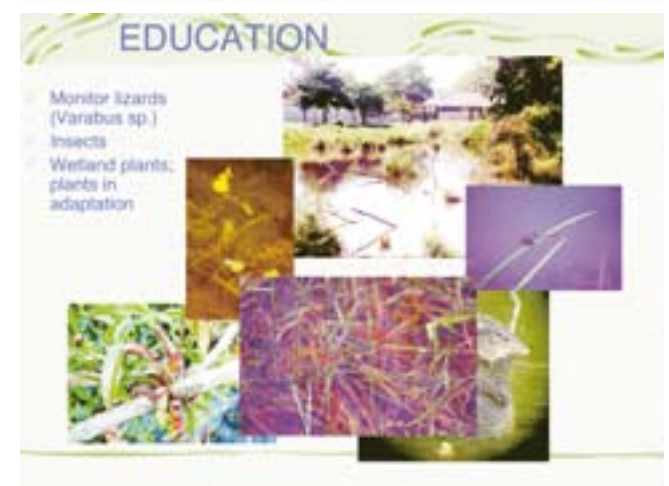
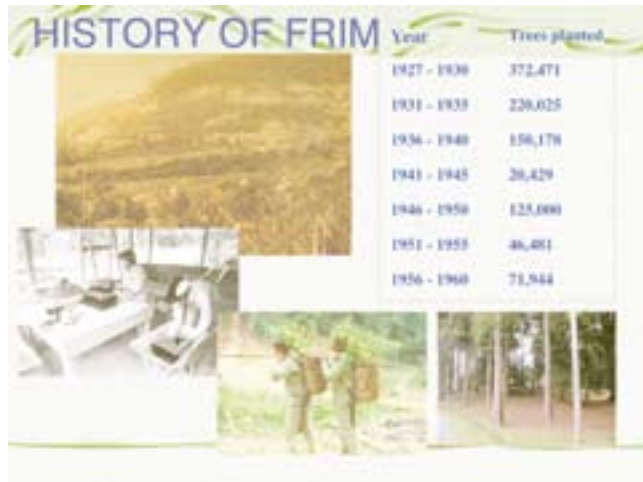
MALAYSIA: MANGROVES

Conservation Efforts

- Government: Forestry Depts
- Private: Perwira Bintang
- NGOs MNS & WWF







Wetland Education

Nature Interpretation Camp,
themed "Treasures of Wetland"

- Interpretation kit in conducting
environmental education
programme relating to freshwater
wetland



WETLAND INTERPRETATION FRIM

Birds spotted:

Kingfishers
Gold-whiskered Barbets
Crested serpent eagles
Greater racket-tailed
drongos
Yellow bitterns
Etc.



WETLAND INTERPRETATION ACTIVITIES



WETLAND INTERPRETATION ACTIVITIES



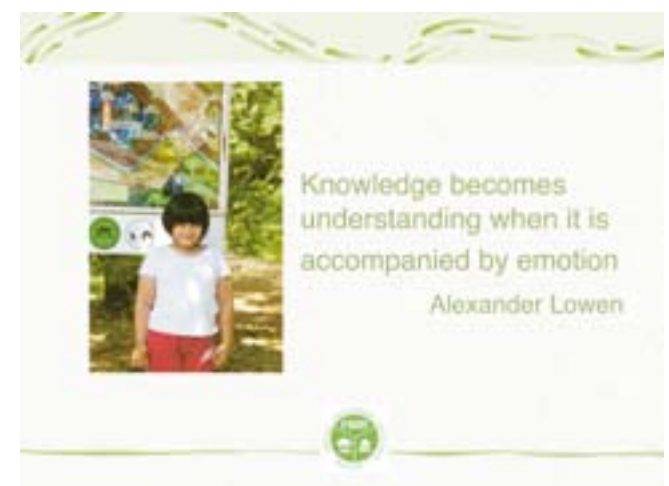
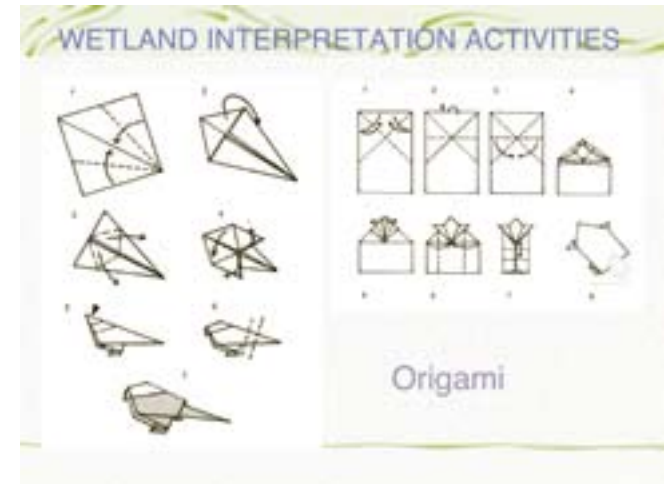
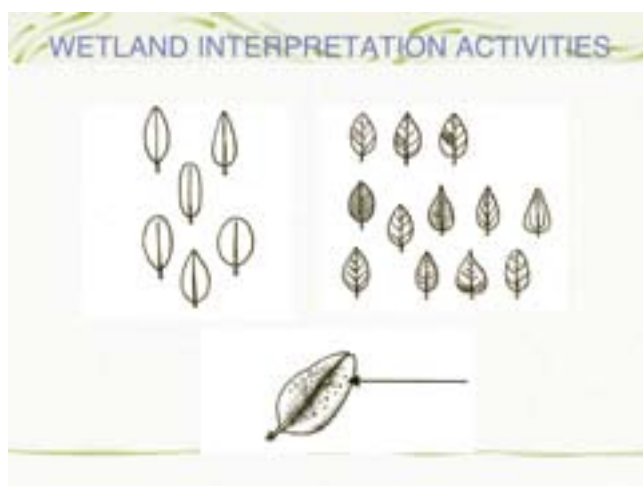
Floating
plant: Hydrilla



Submersed plant:
Vallisneria

WETLAND INTERPRETATION ACTIVITIES





Participants' Post-Workshop Recommendations for Museum of Bangpakong Borvorn Witthayayon School

(Improvement plan)



What we can do to improve...???

- Purposes of the museum in relation to the mangrove?
- Who will benefit?
- Who will be involved?

Museum Display

- Story line
- Sectional displays
- Diorama
- Poster
- Label and caption

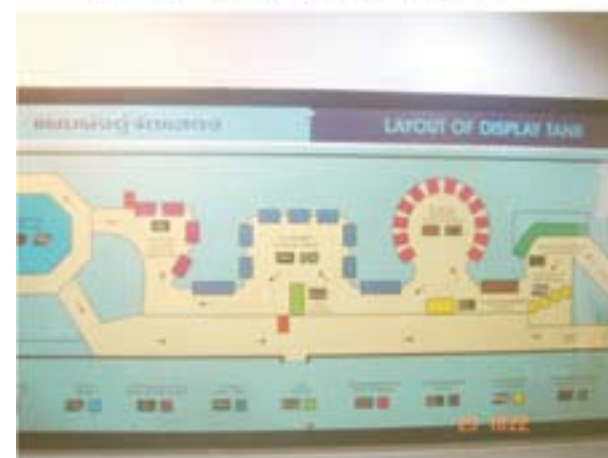


Story line

- Introduction history, school, mangrove
 - floor plan
- Museum objectives
- What to highlight?



Example of floor plan



Sectional display

Artefacts or specimens related to the mangrove

- Zoological
- Botanical
- Geological
- Artistic
- Economic
- Audio-visual



Zoological specimens



Example of living specimen



Botanical



Art & culture



Diorama

- Mangrove ecosystem
- Species of mangrove trees



Posters

- Informative
- Beautiful images
- Creative illustration
- Attractive



Label & caption

- Informative
- Brief
- Language: Thai / English
- Scientific label (genus, species, family)
- Local names
- Uses / functions
- Font size; easy to read



Facilities

- Lighting
- Air-conditioner
- Humidifier
- Safety measures
- Herbarium
- Laboratory
- Limited areas / space

Lighting

- Indoor
- Artefacts / specimens
- Showcases
- Should not react to artefacts (not too bright or dim and hot)

Air-conditioner

- Visitor comfort
- Preservation of wet specimens / some artefacts
- Cleanliness

Humidity control

- Humidifier
- Control humidity inside the gallery
- Higher humidity might ruin the specimens
- Fungus prevention
- Conserve the specimens/artefacts

Safety measures

- Fire extinguisher
- Exit door
- Signage



Herbarium

- Storage of scientific collections of mangrove forest
- Useful and scientific references
- Library
- Facilities for researchers, botanists, taxonomists

Laboratory

- Scientific activities
- Taxidermy
- Skeleton studies



Education & Publication

- Brochure
 - introduction
 - location / map
 - visitor information
 - attractions



Book

- compilation of museum displays or mangrove
- history
- flora, fauna, geology, art,
- attractive images / photography
- importance of mangrove

Mini guidebook

- guidelines to the mangrove trail
- species of flora and fauna
- rules and regulations



Souvenirs



Museum's Highlights

- Awareness of biodiversity
- Conservation
- Mangrove eco-system
- Interaction between humans and mangroves
- Threats to mangrove forests
- Benefits from the mangroves

Maintenance

- Clean regularly
- Involve students in cleaning
- No littering!

Management

- Use cost effective wood preservatives on boardwalk (e.g. crude oil, etc.)
- Check tidal flow and restore tidal connection if possible/ required.



Management (cont.)

Measures to reduce littering (e.g. restrict packaged food and drink).



Enrich areas by planting other tree species.



Signage

- Signage should highlight common animals (e.g. crabs, fish, birds, etc.)
- A "Swamparium" with common mangrove animals
- Brochures/ leaflets at entrance
- Signs should highlight adaptations of *Avicennia*



Signage (cont.)

- Distribution map of *Avicennia marina* showing local names in different countries
- Self-guided audio tour



Education Activities

- "A night at the swamp" – overnight educational program
- Activity sheets for visitors
- Puppet or other performances showing mangrove life
- Creation of a simple dance performance to illustrate mangrove life
- Mangrove "fashions" (showcase clothes colored with dyes derived from mangrove plants)



Educational Activities (cont.)

- Monitor mangroves through observing and documenting findings in a database (in collaboration with resource persons)
- Monitor:
 - flowering, fruiting
 - animal diversity
 - Migratory birds
 - Tree growth and dynamics
- Use mangroves for food, crafts...
- Firefly tour



The following are recommendations presented by the workshop group assigned to study the area (approx. 1 km²) comprising of boardwalk, fish pond and dam (Bangpakong river)



Rhizophora

Labeling – Poisonous Plants



Excoecaria agallocha L. : a mangrove plant which secretes toxins.

- Cautionary signage
- Consolidates all poisonous plants in a control area

Drainage System



Meeting point for all water from the mangrove.
Improve the landscaping

Improve the Drainage System



Improve the drainage system, landscaping and aesthetics

Remove Dead Trees



Remove dead trees and replant.

Pool for Rearing Fishes



- Attract the Kingfishers for observation.
- Construct an observatory platform extending out to the side/centre of the pond.

Improvement to this area



Pilot testing area for research. Example:- testing area for transplantation of new species

Remove unused structure



Modify the retaining structure into a walkway



Landscaping and aesthetics

New walking paths



New walking paths from this location. There are approximately 8 km² to be explored.

Unused structure



To be removed.....

Grasses removal and replanting



Landscaping and aesthetic of the "Ya Nak" place of worship



Improvement of the Boardwalk



Backfill with soil to improve the stability of the retaining structure



Firefly Issues

Alumni versus teachers



Alumni suggested removing trees so that the view to the Bangpakong river is not obstructed.

Teachers argued that by removing trees, the habitat of the fire-fly will be destroyed.

Recommendation of group: adopt both options. When the mangrove trees grow, there will be no total obstruction of view (i.e. between the trunks of the trees). Keep fire-flies which are another attraction in the site. Trimming of branches for better view.

Rubbish Galore



Self-explanatory and perhaps a provincial/national issue?

Conclusion and Summary

TO DO LIST

1. Dispose solid waste and install portable solid waste receptacle
2. Repair boardwalk
3. Improve landscape
 - eliminate grasses,
 - control poisonous trees (transplant all poisonous plants to a controlled area and label them)
 - place of worship ("ya nak")
4. Signage
 - site map, directional tools, labels of genera and species of flora and fauna, general information of the area, cautionary signage

Conclusion and Summary

5. Provide knowledge (Guide Book)
 - biology, ecology, conservation
 - local community culture and heritage
6. Local community development with respect to environmental conservation
7. Set up
 - activities area (boardwalk)
 - attractive areas/points
 - observatory platform to study birds and fishes and mangrove organisms
8. Resolve fire-fly issue
9. Set up trails, walk ways, and observatory platform around pond and dam areas

Short-term plan (< 1 yr)

Activities	Target Beneficiary	Working group/staff	Supporter/foundation
Dispose solid waste and install portable solid waste receptacle	School and all visitors	School	School
Repair boardwalk	School and all visitors	School	School
Signage - site map, directional tools, labels of genera and species of flora and fauna, general information of the areas, cautionary signage	School and all visitors	School and university	School

Long term plan (> 1 yr)

Activities	Target beneficiary	Working group/staff	Supporter/ foundation
Improve landscape - eliminate grasses, - control poisonous trees (transplant all poisonous plants to a controlled area and label them), - place of worship ("ya nak")	Eco-tourists	Alumni, school staff, and students	School
Provide knowledge (Guide Book) - biology, ecology, conservation - local community culture and heritage	Eco-tourists, students and researchers, and local community	Scientists, researchers, school staff, students, and local community	SPAFA and University
Local community development with respect to environmental conservation	Local community	All	Local government, school, etc.
Set up - activities area (boardwalk) - attractive areas/points - observatory platform to study birds and fishes and mangrove organisms	Eco-tourists, students and researchers, and local community	All	Local government, school, etc.
Set up trails, walk ways and observatory platform around pond and dam areas	Ecotourists, students and researchers, and local community	All	Local government, school, etc.

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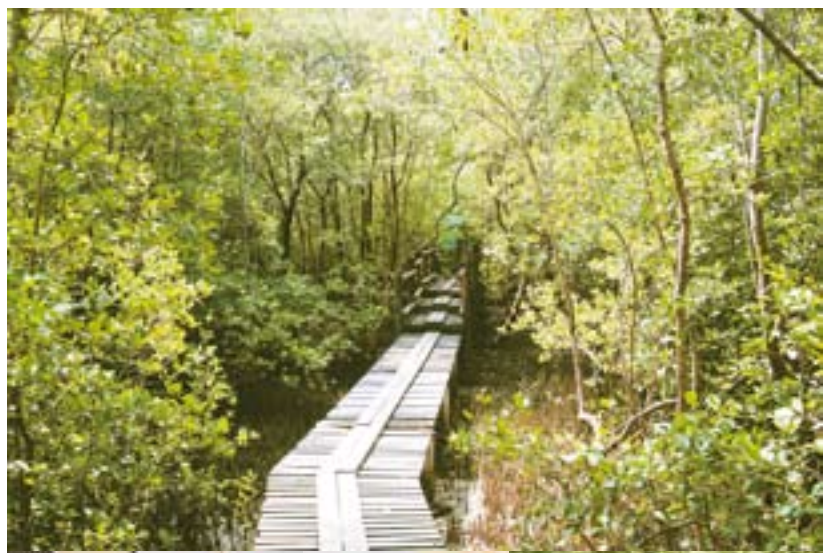
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SEAMEO-SPAFA is one of the centres established by SEAMEO (Southeast Asian Ministers of Education Organisation). It is a regional centre constituted in 1985 from the SEAMEO Project for Archaeology and Fine Arts (SPAFA). SPAFA promotes awareness, appreciation and wise use of the cultural heritage of Southeast Asian countries through the disciplinary fields of archaeology, museology, visual and performing arts, and cultural resource management, including heritage tourism. SPAFA's member-countries include Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, and Timor Leste; Associate member-countries are Australia, Canada, France, Germany, Netherlands, New Zealand, Norway and Spain.