

5. Capacity Building Efforts

The earlier National Policy, Strategies and Action Plan on the Conservation and Sustainable Use of Biodiversity (NBSAP), 1998–2002, mentioned in Chapter 2, stressed the needs of strengthening the capacity of relevant agencies and personnel for efficient and effective biodiversity conservation and sustainable use. However, the implementation of such NBSAP, 1998–2002 has not fully attained the objectives, especially in capacity strengthening. The major obstacle was lack of sufficient financial support. In 2000, the Office of Environmental Policy and Planning (OEPP) assessed the training needs on biodiversity and the outcomes were forwarded to the ASEAN Regional Centre for Biodiversity Conservation (ARCBC). In the following year, OEPP also surveyed the needs on strengthening the capacity in the field of taxonomy. The survey result was analyzed and submitted to CBD Secretariat, for consideration to be included in the Global Taxonomic Initiative (GTI) Program.



Training Needs Assessment on Biodiversity

Background

In early August, 2000, ARCBC requested Thailand, as ASEAN member country and the member of the ARCBC, to conduct an assessment of training needs on biodiversity and protected areas in Thailand. OEPB as the National Biodiversity Reference Unit of the ARCBC, was the agency undertaking the assessment during the months of September and November 2000. An assessment methodology covers data collection and analysis, questionnaire survey, brainstorming among experts and a national seminar. An analysis of the information received provides the results shown as the following.

Current Status on Biodiversity Conservation

Issues Affecting Biodiversity Conservation

*** Biodiversity data management**

- The lack of baseline information on most of the protected areas.
- The lack of a body responsible for disseminating news and knowledge on conservation and sustainable use of biodiversity.
- The lack of comprehensive national database on biodiversity and protected areas. At present a large amount of information is scattered in various stakeholders.

Not Publicly Disclosed or Inaccessible Information

*** Taxonomy, inventory and assessment**

- Existing scientific institutions lack proper supports on biodiversity inventories. For example, with only few experts on bryophytes in Thailand, the inventory of the species in all national parks would take considerable number of years to complete. Thailand seriously lacks qualified personnel on all species, including higher plants and animals.

*** Ex-situ conservation**

- Thailand has relatively clear policies at the national level, approved by the Cabinet. At the agency level, however, policies on each biodiversity issue have not been clearly described or identified.
- The lack of acceptance of central organization in setting direction for conservation and sustainable use of biodiversity, by both public agencies and general public.
- Inappropriate classification and declaration of the protected areas.
- The lack of independence in biodiversity administration (overlapping responsibility).
- The lack of detailed studies and researches related to management aspect.
- The lack of strong responding measures.
- Presence of some self-interest organizations.
- The lack of cross-sectional coordination and collaboration between different government and private agencies.

*** In-situ conservation**

- Low social basis for conservation.
- The lack of variety of legally protected areas, limiting management flexibility of the areas.
- Concerned legislation do not provide clearly defined primary and secondary objectives of the protected areas, creating confusion to both the population and the authorities enforcing the laws.

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- Confusing administration of some protected areas.
 - The lack of management plans and administrative guidelines for certain types of protected areas as well as for some specific areas.
 - The lack of efficient monitoring systems.
 - The lack of cooperation amongst public agencies and between public agencies and private organizations.
 - Problems from decentralization and inappropriate public participation. The local participation in natural resource and protected area management and biodiversity conservation, is still limited even though various laws including the Constitution promote the decentralization of authority to the local governments and public and local participation. The major limit is in terms of their management capacity.
 - The lack of social cooperation and responsibility.
 - The failure in promoting and supporting biodiversity related activities of the local people.
 - The lack of continuity due to the absence of planning that enables supported projects to be self-sustained.
 - Absence of demonstration for executing personnel.
- Problems concerning the lack of research coordination, tools and equipment and new techniques.
 - The lack of acceptance of governmental legislations and regulations.
 - The society lacks scientific knowledge.
 - The society is misled by incorrect views from within and outside the country.
 - The lack of consistency in governments policies.
 - The lack of acceptance by certain groups of the population. Several groups do not accept the declaration of national parks.
 - The lack of scientific development.
 - Global awareness of biodiversity importance, through its inclusion as condition for international trade.

* **Economic evaluation**

- Ignorance and unawareness on the economic value of biodiversity conservation especially in protected areas such as some important wetlands of the country.

Stakeholders' Competencies

In Thailand, the tasks of biodiversity conservation and protected area management are conducted by at least 15 governmental agencies. In addition, various private sectors and non-governmental organizations are also involved.

For effective biodiversity conservation and protected area management, stakeholders must possess certain skill, knowledge and values. Those quality are possession of basic and thorough understanding and knowledge, personnel interest, and ability to identify problems and develop mitigation measures, in addition to an awareness on importance of biodiversity conservation and protected area management.

Major Concerns

From an assessment, lacks of sufficient, correct and common understanding on issues concerning biodiversity conservation and protected area management were found among various stakeholders.



✿ Politicians

The lack of interest by politician can be seen from extremely limited public funding and financial assistance approved to support works on biology and ecology, in comparison to those allocated for construction and infrastructure development. Provision of ecological and biological knowledge and understanding, via training, for high-ranking politicians are thus of significant importance. With such knowledge and understandings, the politicians would also be better equipped to identify and subsequently take proper action to prevent biodiversity loss from national development projects.

✿ Administrators

The administrators and decision-makers should understand the importance of biodiversity and protected area to ensure their recognition of conservation value. These can be assisted by development of decision-maker's handbooks, to be used for making decision in areas, which are of considerable importance for biodiversity. Issues to be highlighted in the manual should include botany and zoology as well as ecological mechanism for biodiversity conservation.

✿ Researchers and technical staff

Many technical staff, researchers and stakeholders are not familiar with the term "biodiversity" and believe that the concept (biodiversity) is not related to their works. Such belief has resulted in the absence of interest in developing training courses on biodiversity. Therefore, the researchers and staff must be equipped with clear understanding of biodiversity in order to enable further communication and dissemination of the concept to individuals at other levels.

✿ Taxonomic personnel

Limited number of taxonomic personnel and funding for taxonomic researches in Thailand is the underlining reason of the country 's failure in completing classification of all plant and animal specimens collected from the past surveys. This problem is of significant importance since identification of species is the primary basis for biodiversity conservation. Proper classification of species would allow for determination of their conservation status and eventually formulation of protection regulations and measures for the species. Training activity on taxonomy is therefore urgently required.

✿ Locals

One of the factors of the loss and threat on biodiversity and protected areas is the lack of participation and sense of ownership of biological resources by the community. Provision of proper knowledge to locals who live with and make use of biodiversity and its components, would enable them to cooperate and undertake scientifically sound conservation of biodiversity.

✿ Youths

New generations of youths, with interest on biodiversity issues, should be provided with an in-depth understanding of biodiversity conservation, in order to secure social strength and support for the conservation.

✿ National representatives

Thailand still lacks qualified personnel that are capable of performing the role of national representatives in coordinating international cooperation. Such need must be urgently addressed and met through training of the personnel.

N e e d s o n T r a i n i n g

Current Training Programs

Various stakeholders have implemented existing training programs in Thailand. Some of them have sole responsibility in training, while others have training divisions or training responsibility attached to their major function on biological conservation and protected area management. Some of the latter stakeholders are within the Ministry of Agriculture and Cooperatives, i.e. the Department of Livestock Development (DOLD), the Royal Forest Department (RFD), the Department of Agriculture (DOA) and the Department of Fisheries (DOF).

Biodiversity Research and Training Program (BRT), under the National Science and Technology Development Agency (NSTDA), has one of the seven programs implemented on Human Resource Development and Training in Tropical Biology. During the last five years (1996–2000), nearly 50 training projects have been organized. The Asian-Pacific Regional Training Center on Community Forestry is another example of agencies with significant role in biodiversity related training. This training center aims to support public participation in sustainable forest resource management. The Center gives training priority to biodiversity conservation issues. Other than those, the Wildlife Fund Thailand, in 2000, organized at least 12 training courses related to biodiversity conservation.

At present, however, most of the current training programs or training courses offered by the above stakeholders are on the conservation and management of natural resources designed for participants responsible for specific resources. Moreover, even though there are training courses to strengthen the capacity of the stakeholders' staff, still the training is organized with certain purposes and without clear evaluation of the effectiveness and ultimate impact of the training.

Strategies

* **Covering all types of ecosystem**

Such training would allow for the formulation of appropriate guidelines on biodiversity conservation for each type of ecosystems that are able to accommodate flexibility and convenience in the conservation of biodiversity and protected areas. Such training would be effective in communicating correct understanding to the participating public as well.

* **Covering all target groups**

The target groups for training include politicians, high-ranking administrators, medium-level administrators, public servants, students, general public, locals, community leaders, NGOs, related development groups and the press. Different training courses should be designed and offered for each target group.

* **Covering broad and specific technical aspects**

The courses offered are designed and based on the gaps of tasks in biodiversity conservation and protected area management in addition to the gaps of existing training program offered and being offered in Thailand. For these reasons, technical in addition to general courses are proposed.

Training Programs Needed

Training programs that would support and strengthen the capacity of all stakeholders to perform their tasks on biodiversity conservation and protected area management for Thailand can be summarized in seven prioritized programs: biodiversity data management; taxonomy; biodiversity inventory and assessment; *ex-situ* conservation; *in-situ* conservation and protected areas management; biodiversity awareness; and economic evaluation. List of the programs is shown in the Table 3.

Table 3 : Training Needs on Biodiversity for Thailand

Program	Training needs/targets
Biodiversity data management	<ul style="list-style-type: none"> * Botany * Biodiversity data management, to enable an establishment of networks of database on biodiversity conservation and protected area management * Promotion on the use of appropriate software for prediction and planning * Training of high-ranking administrators on importance of biodiversity information management
Taxonomy	<ul style="list-style-type: none"> * Training for production of taxonomists and para-taxonomists, including students and other interested individuals * Training of high-ranking administrators to ensure their understanding on importance of taxonomists and taxonomic researches * Training of science writers to enable them to better understand taxonomy and to correctly and effectively transfers such understanding to the public * Training of scientific illustrators * Training of personnel of other biodiversity related stakeholders * Training on the use of technologies for taxonomic works, such as the use of DNA for identification of species
Biodiversity inventory and assessment	<ul style="list-style-type: none"> * Use of appropriate indicator for inventory and assessment * Monitoring the hatchery and nursery grounds * Inventory techniques and methodology for different kind of plant and animal species * Identifying key species for inventory * Assessment of impact from development to biodiversity, and mitigation measures
Ex-situ conservation	<ul style="list-style-type: none"> * An understanding on conservation and management principles and the recognition of the need of conservation * A knowledge on present national policy and measures on biodiversity conservation and protected area management * An understanding on criteria and process on access to genetic resources
In-situ conservation and protected areas management	<ul style="list-style-type: none"> * Training concentrating on <i>in-situ</i> biodiversity conservation for different types of ecosystems * Training on conservation of species, in addition to awareness raising and the significance of establishing networks * Understanding of measures for biodiversity conservation in selected protected areas * Understanding of conservation of biodiversity for sustainable development * Understanding the values of endangered species in local area * Creating awareness and networks for learning, community participation to initiate social cooperation and responsibility * Sustainable planning and monitoring for conservation
Biodiversity awareness	<p>To rectify those problems, training should be provided for the following target groups;</p> <ul style="list-style-type: none"> * General public * NGOs with emphasis on common and correct understanding on biodiversity conservation * Locals and local leaders, focusing on correct and continuous understanding of biodiversity conservation * Relevant development sectors, to ensure understanding of biodiversity conservation
Economic evaluation	<p>A direct and indirect technique on economic evaluation of biodiversity and promotion of understanding and knowledge on economic value of biodiversity conservation offered to public servants and government officials, especially at the local level, will allow them to realize the economic value attached, and help decreasing the loss.</p>

National Taxonomic Needs Assessment

Background

Realizing the lack of taxonomic knowledge as an obstacle to biodiversity conservation, the Conference of the Parties (COP) to the Convention on Biological Diversity has established the Global Taxonomic Initiative (GTI). GTI will provide common framework for combating inadequacy of taxonomic information and experts and enhancing informed decisions on conservation of, sustainable use of and equitable sharing of benefit deriving from biodiversity components. The GTI targets strengthening of relevant national institution, providing linkage between institutions in developing and developed countries and seeking means to enable effective use of taxonomic information by countries of origin.

Coordinating mechanism for the GTI, established in accordance to a decision of the 5th Meeting of the Conference of the Parties, has coordinated activities implemented under the GTI and ensured harmonization with activities under the Convention. The Secretariat of the Convention prepared and submitted a work program on the GTI to the 6th Meeting of the Convention's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). The Secretariat also requested the Convention's Contracting Parties to nominate a national GTI focal point to enable linkage with the Secretariat, to coordinate with other countries on sharing information through regional network, to be responsible for providing requested taxonomic information to the Secretariat and to prepare for international consultation on the GTI.

The Office of Environmental Policy and Planning (OEPP) was appointed by the National Committee on the Convention on Biodiversity at the meeting on June 26, 2001, as the national GTI focal point, responsible for carrying out the following activities;

- Conducting national taxonomic needs assessment, including review and study of specific requirements.
- Compiling a national list of institutions and experts on taxonomy.
- Compiling a national list of agencies with collection facilities or museums.
- Establishing and maintaining a national taxonomic network.

OEPP designed and distributed a questionnaire entitled "A National Taxonomic Needs Assessment" to agencies involved in taxonomic works. These agencies include the Royal Forest Department (RFD), Department of Fisheries (DOF), Department of Livestock Development (DOLD), Department of Agriculture (DOA), Department of Agricultural Extension (DOAE), institutions under the Ministry of University Affairs (university's institutions) and other relevant agencies. The questionnaires were distributed to the agencies in early July 2001, to initiate linkage of taxonomic information in Thailand between experts in the agencies.

Sixty-seven questionnaires were returned to OEPP (three specified that they were not involved in taxonomic works and did not inform any needs). Preliminary analysis of the information received provides the results shown below.

In addition, the GTI Thailand Regional Meeting on a National Taxonomic Needs Assessment was held in Bangkok from October 17–18, 2001. The Meeting was financed by the ASEAN Regional Centre for Biodiversity Conservation (ARCBC).

Current Status on Taxonomic Institutions

Types of Institution

Most of the 64 institutions who returned the questionnaires, is not directly responsible for taxonomic collection, but required to collect specimens for their own needs. Up to 86% of institutions have undertaken some forms of specimen collection, however there are few funding institutions in comparison to these involved in taxonomic works (see Figure 1).

Other Capacities of Institutions

* Collection facilities

Most of the specimen-collecting institutions were equipped with 1–2 collection rooms. Twelve institutions were identified to store their collections in properly designated building. These institutions are Wildlife Museum Institution of DOF, Forest Botany Division of Forest Research Office, Herbarium of Suan Luang Ro Kwao (King Rama 9th Park), National Science Museum, Zoological Park Organization, Botanical Garden Organization, Specialized Microbe Specimen Collection Center, Department of Biology, Faculty of Science, Chulalongkorn University and Department of Biology, Faculty of Science, Chiang Mai University.

* Taxonomic laboratories

From the above-mentioned 55 institutions, larger proportion was reported to have 1–5 taxonomic laboratories.

* Equipment for taxonomic works

> Equipment for Collecting Specimens

The equipment reported was diversified in accordance to organisms studied by each institution. These usually include nets, forceps, alcohol and other liquid for preservation, jars, cabinets etc.

> Equipment for Classification of Specimens

The equipment reported varies in accordance to type of studies and size of specimens. These include stereo microscope, compound microscope, related camera lucida, PCR etc.

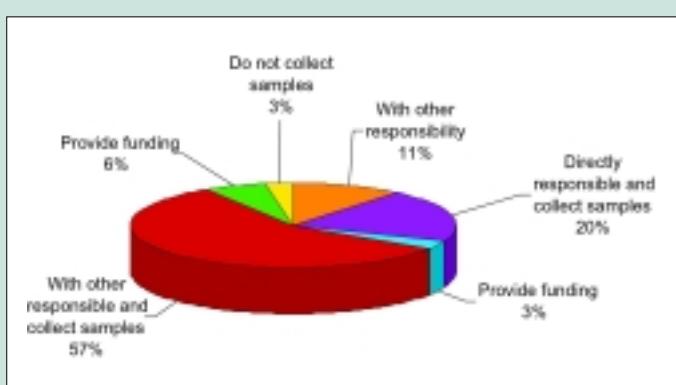


Figure 1 Types of national institutions

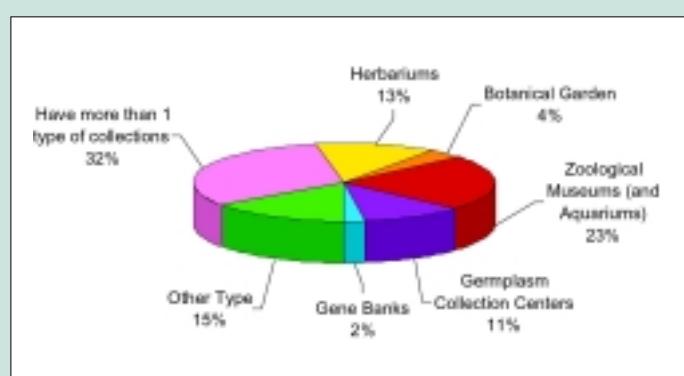


Figure 2 Types of collections in various national institutions

> *Data Collection Instruments*

The data was reported to be collected, stored and analyzed with conventional computers.

> *Vehicles Used for Specimen Surveys*

Most institutions were found to use cars for field visits. Some were reported to access to the sampling sites by boats.

* **Annual budget for taxonomic works**

Sixty-four institutions responded to the questions concerning budget allocated for taxonomic works. It was cleared that very limited funding has been provided for taxonomic works, while specific taxonomic works are often without any funding. Majority of finding for taxonomic works was reported to come from governmental budget, which is inadequate for carrying out the works. Only 5 institutions were reported to be allocated with budget greater than 1 million Baht for taxonomic works. These institutions are Aquatic Genetic Research and Development Institute of DOF, Entomology and Zoology Division and Botany and Weeds Division of DOA, Department of Biology, Faculty of Science, Ramkhamhaeng University, and Environment, Ecology and Energy Section of Thailand Institute of Scientific and Technological Research (TISTR).

* **Number of personnel involved in taxonomic works**

Of 49 institutions, 277 taxonomists were reported. Of 39 institutions, 217 para-taxonomists were identified.

Status of Taxonomists

The survey found that of 277 taxonomists, 75 are with institutions directly responsible for specimen collection, 187 are employed in institutions with other responsibilities but required specimen collections, 8 are with institutions responsible for taxonomy-related tasks but do not carry out any specimen collections and 7 works for institutions with other responsibilities. Fifty-one percents of the taxonomists are female. Most of them are Master degree graduates and belongs to 26–45 year olds age group. When classified in accordance to the groups of organisms they are responsible, 82 work on botany, 70 on invertebrates, 47 on vertebrates, 51 on microorganisms, 10 on plankton, 9 on algae, 6 on parasites and 2 on protozoa. Those responsible on animal and plant groups are accounted for over 70%, due largely to diversity of known species, followed by microorganisms, plankton and algae, respectively. Very few taxonomists were found to work on parasites and protozoa (see Figures 3-5).

Needs on Taxonomic Capacity Building

Institutional Capacity Building

* **Need for additional taxonomists**

Forty-two institutions expressed their need for additional 190 taxonomists in total, 93 from institutions directly responsible for specimen collection, 74 from institutions with other responsibilities but required specimen collections, 6 from institutions responsible for taxonomic related tasks but do not carry out any specimen collections and 17 from institutions with other responsibilities. When classified on the basis of specialization, the required taxonomists include 79 plant specialists, 44 invertebrate specialists, 37 vertebrate specialists, 25 specialized in micro-organisms, 2 plankton specialists, 2 parasite specialists and one algae specialist. The needs are often based on the lack of particular specialists in the institutions, transfer or retirement of existing taxonomists, overwhelming amount of specimens yet to be classified or the desire to enhance effectiveness and capability.

* **Needs for para-taxonomists**

In total, 40 institutions stated their need for additional 432 para-taxonomists. Para-taxonomists are mainly required for providing assistance to existing taxonomists such as in the survey and specimen collection, specimen maintenance, systematic storage and management of data as well as to reduce workload of the taxonomists in researching and teaching and allowing more productive works on taxonomy.

* **Needs for collection facilities**

From 55 institutions where specimen collection have been conducted, 31 (56.36%) indicated their needs for rooms/buildings to store the increasing amount of specimens. The main reasons provided are to accommodate better arrangement of present and future collection, enabling more sustainable use and to enable better access to interested individuals for study and other reference works.

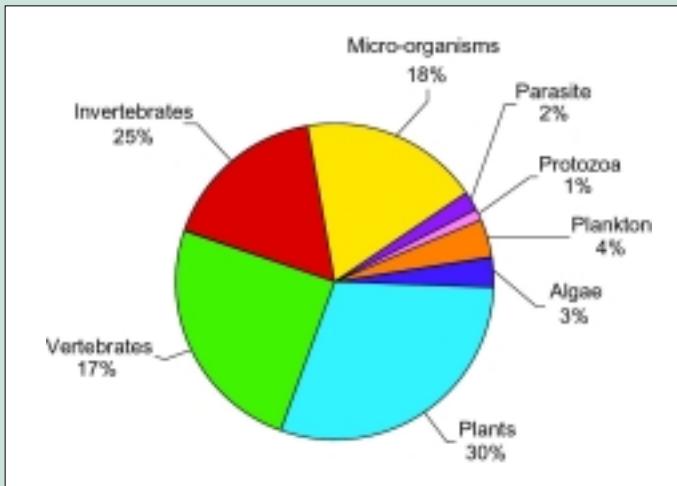


Figure 3 Percentage of existing taxonomists in each discipline

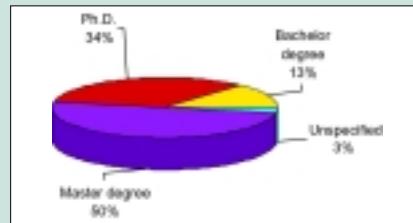


Figure 4 Qualification

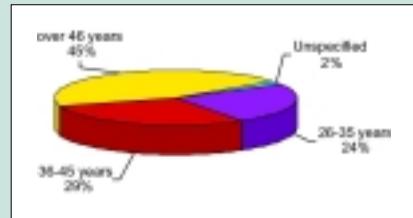


Figure 5 Ages

* **Needs for taxonomic laboratories**

Twenty-nine institutions (52.73%) from 55 specimens-collecting institutions stated their needs for additional laboratories in order to separate specimen classification and analysis from other research activities, enabling greater efficiency and teaching of visiting classes.

* **Equipment/instruments needs for collecting specimens**

Over 50% of 55 specimens-collecting institutions confirmed their demands for additional equipment for collecting specimens or replacing existing ones with more appropriate tools. The equipment required is varied accordance to organisms being studied. In general, these include nets, scuba diving gears, forceps, preservation liquid, liquid nitrogen, specimen jars, oven, cabinets, etc.

* **Equipment/instruments needs for specimen classification**

From the above-mentioned 55 institutions, 32 (58.20%) specified their needs for additional equipment for classifying specimens. Most of them demanded microscopes with varied specification, depending on types of studies and sizes of concerned specimens, including stereo microscope, compound microscope, related camera lucida, PCR machine, DNA sequencing, electrophoresis equipment etc.

* **Equipment/instruments needs for data collection**

Thirty-four institutions from 55 specimens-collecting institutions (61.82%) stated their needs for computers to be used for data collection tasks, in order to facilitate searching and retrieval for analysis and other uses.

* **Needs for vehicles**

Approximately half of 55 specimens-collecting institutions expressed their needs for vehicles (cars & boats) to facilitate specimen collection expedition.

* **Needs for funding for taxonomic works**

From all respondents, 29 institutions stated their needs for additional funding for taxonomic works, ranging from 100,000 to 1,000,000 Baht annually.

Capacity Building for Taxonomists

There were 43 institutions expressing their needs for training on various topics, varied in accordance to their types of works and concerned groups of organisms. Examples are shown below.

> Department of Fisheries

The National Inland Fisheries Institute expressed a demand for training to produce 40 para-taxonomists. Such training should last 10 days of lectures and field exercises and 5 days of training on specimen preservation. This training requires that the applicants must be at least vocational college graduated and have no less than 2 years experience. The Fisheries Resources Conservation Division stated a need for 3 days basic taxonomic training on protected species (listed in the 1992 Wildlife Protection Act) to be provided to 30 fishery conservation officers, fisheries quarantine officers and resources administration and management officers. The Aquatic Animal Health Research Institute seek 2–4 months training on classification of parasitic fungi in aquatic animals at the Veterinary and Science University, Japan, on the classification of aquatic parasites with both classical and modern taxonomy at the Institute of Parasitology, Czech Republic and classification of bacteria and virus with modern taxonomy in Japan.

> Department of Livestock Development

The Animal Disease Diagnosis and Research Center-Lower Northeastern Region stated the need for training courses on specific working areas of the Center, which are communicable diseases, parasite, virology, bacteriology, immunology, toxicology and biochemistry. The training should be provided for at least one person from the Center in either domestic or oversea institutions. The Animal Disease Diagnosis and Research Center-Western Region (Ratchaburi Province) expressed the need for taxonomy training on parasite, virology and bacteriology to be provided to at least 2 persons per subject at the National Animal Health Institute, Chulalongkorn University. The training should last 10–15 days per course at the veterinarian and scientist levels.

> Royal Forest Department

The National Park and Wildlife Research Division stated the need for 2 months training on zoological classification for 4 persons at the National History Museum, London. The Forest Botany Division of Forest Research Office expressed the need for overseas training in internationally recognized institutions, the like of those in the United Kingdom, Netherlands and Japan, and visits of the Division's taxonomists to overseas herbariums.

> Universities

The Department of Biology, Faculty of Science, Chulalongkorn University can organize training courses on zoological taxonomy to interested institutions. Professor Kasin Suvataphun, Department of Botany, Faculty of Science, Chulalongkorn University is able to offer training on numerical taxonomy, pollen analysis, pollen biology, basic training on ornamental plants, plant specimen preservation techniques and botanical classification. The participants include elementary and secondary school teachers, national park officers, and tourist guides. Training on algae can be offered to high school teachers and university lecturers. The training is offered for 25–30 persons in 3–5 courses. The Department of Biology, Faculty of Science, Ramkhamhaeng University stated the need for training on higher plants, fungi, lichen, birds, insects, mammals and corals at RFD, Royal Forest Herbarium and DOA. The training should be offered twice a year in 5–7 days courses for 10–15 persons. The Marine Science Institute, Burapha University requested 2–3 months systematic taxonomy training on sea sponges and marine molluscs at the Western Australian Museum for 1 person per subject and 3–4 months training on molecular technique for taxonomic study at Mahidol University for 1 person. The Department of Plant Pathology, Faculty of Agriculture, Khon Kaen University demanded for Certification Identification of Bacteria level training mycology at CAB UK for 2 persons in a 20 days certified course.

Capacity Building on Information

* Needs for additional human resources for data collection and programmers for building taxonomic database

All institutions that work on taxonomy or with taxonomic specimen collection requires, on average, addition 1–2 staff to assist in data management tasks.

- There are 42 institutions indicating the needs for additional data management personnel, totaling 79 persons (one institution did not specify the number of required staff).
- There are 37 institutions indicating the needs for additional programmers, totaling 44 persons (one institution did not specify the number of required staff).



✳ **Need for the establishment of taxonomic information network**

There are 39 institutions endorsing the proposed establishment of taxonomic information networks. Of these, 36 are those working on taxonomic researches or with specimen collections while the remaining 3 are institutions responsible for inspection and control of import, export and illegal trade, diagnosis of animal diseases and teaching. All institutions agreed that there is a need for linkage of taxonomic information on various disciplines with relevant institutions, domestically and internationally, including at the ASEAN regional level and with those in Europe and Africa.

✳ **Needs for organizing meeting to exchange views/information on taxonomy**

Thirty-five institutions stated the demand for forums/ meetings for exchanging overall views on taxonomy. The institutions also demanded

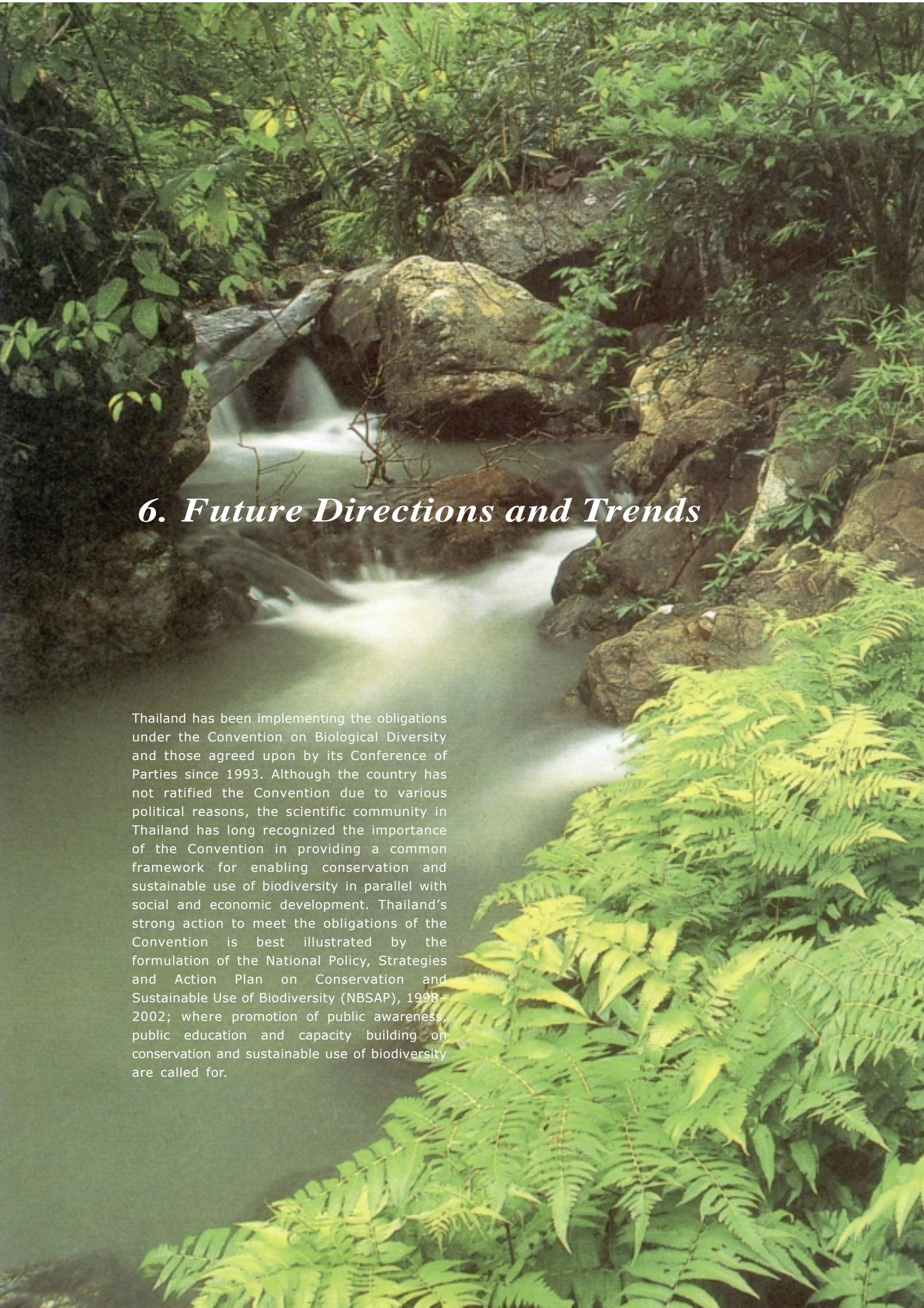
for meetings to discuss and share opinions/information on specific topics, based on types of works and groups of species, between academics and experts from institutions in the country and from overseas.

✳ **Need for specialists**

There are, in total, 30 institutions indicating their need for domestic and foreign specialists to assist them in certain areas where expertise is inadequate, especially in new classification methodologies and techniques.

Other Needs

Other needs of respondents are relatively similar, such as additional budget, promotion of taxonomic works, textbooks and other taxonomic reference materials, annual training, provision of opportunities and support of new generations of taxonomists. Meeting these needs, however, depends on cooperation between taxonomists.

A photograph of a lush, green forest scene. In the center, a waterfall cascades down a rocky cliff into a pool of water. The surrounding area is filled with dense foliage, including large green ferns in the foreground and various trees and shrubs in the background.

6. Future Directions and Trends

Thailand has been implementing the obligations under the Convention on Biological Diversity and those agreed upon by its Conference of Parties since 1993. Although the country has not ratified the Convention due to various political reasons, the scientific community in Thailand has long recognized the importance of the Convention in providing a common framework for enabling conservation and sustainable use of biodiversity in parallel with social and economic development. Thailand's strong action to meet the obligations of the Convention is best illustrated by the formulation of the National Policy, Strategies and Action Plan on Conservation and Sustainable Use of Biodiversity (NBSAP), 1998–2002; where promotion of public awareness, public education and capacity building on conservation and sustainable use of biodiversity are called for.

National Policy, Strategies and Action Plan on Conservation and Sustainable Use of Biodiversity

Despite a shortage of funding due to economic crisis, the first NBSAP was actively implemented by designated agencies and, in principle, achieved most of the expected goals. Although several activities included in the NBSAP were not carried out, the NBSAP did stimulate awareness of relevant institutions and individuals on importance of national strategies on biodiversity and led to overwhelming contributions from these institutions in preparing the following NBSAP, 2003–2007. The Cabinet endorsed the second NBSAP on June 11, 2002 with an approved budget of 7,536.97 million Baht.

To achieve real results, implementation of NBSAP in Thailand requires exceptionally comprehensive cooperation. Therefore, the second NBSAP (2003–2007) is drafted on an area approach basis with more focus on local conservation of biodiversity where provincial authorities, respected Rajabhat Institutes and local NGOs play more active roles in its implementation. More clearly defined mechanisms for monitoring are included in the second NBSAP and could enhance effectiveness in meeting its objectives.

Biosafety

During the past decade, Thailand developed regulations on controlling the use of GMOs as described in Chapter 4. Although the country's efforts in controlling the use of GMOs for agriculture and food industry have been quite effective, Thailand still lacks mechanisms to oversee and regulate import, export, research and experiment concerning transgenic plants, animals and microorganisms. Therefore, the country has not been able to adequately meet obligations under the Cartagena Protocol. There are also needs for an establishment of coordinating mechanisms, appointment of a national focal point and creation of Biosafety Clearing House to enable Thailand to effectively and efficiently enhance the capacity of institutions and their human resources.

Invasive Alien Species

There has not been a national effort to address management as a whole of invasive alien species in Thailand. Despite the fact that several laws are related to invasive alien species and prohibit importation of non-indigenous pests, Thailand still requires mechanism for monitoring and eradicating invasive alien species. Other mechanisms include a focal point who is capable of coordinating efforts between agencies and international organizations and guidelines or legal measures to ban import of non-indigenous species, eradicate invasive alien species and disseminate relevant knowledge to the public.

Global Taxonomic Initiatives

Local taxonomists have consistently called for an establishment of an agency to coordinate capacity building in the field of taxonomy. In addition, the National Taxonomy Council is required to harmonize efforts of approximately 200 taxonomists in Thailand and to provide attention to the areas where assistance is needed. More capital investment is also needed for equipment to be used for the preservation of samples and specimens in the museum while additional financial resources should be allocated to enable studies of native samples specimens in oversea collection facilities.

Biodiversity Inventories and Red Data

Thailand has recognized that a national inventory of biodiversity is of critical important, particularly in identifying undocumented biodiversity "hotspot". Compiling Red Data of plant and animal species is an efficient and vital mean in meeting objectives of such inventory, by providing indicators of level of biodiversity in areas of interest. In addition, the list of Red Data species is a baseline information for developing and revising species protection legislation and readily adaptable reference for decision-making process. OEPN has completed the Red List for vertebrates but has been without sufficient financial resources to prepare the list for plant and invertebrate species.

Coordination between Agencies Concerned

Thailand is faced with many different international agreements related to biodiversity. It is difficult to integrate and coordinate their implementation. Responsibility for the Convention on Biological Diversity and the Convention on Wetlands is left to a handful of staff of the Biological Resources Section who are faced with a huge workload and have little time left for coordination activities. Improvement of work structure and increase of number of man-power will facilitate coordination between agencies concerned to implement the NBSAP and the Convention on Biological Diversity as well. New Biodiversity Division under the Office of Environmental Policy and Planning is needed to be established to harmonize the activities in response to the multilateral environmental agreements related to biodiversity.

Financial Support

By not ratifying the Convention on Biological Diversity, Thailand has remained ineligible to apply for GEF funding during the past 10 years. Mobilizing financial resources from other sources has also been difficult due to an unavailability to the GEF's fund.

Clearly, important progress has been made to implement the convention since the Rio Conference. However far more work is required to integrate biodiversity into mainstream development planning, public investment and business activities. This will require much stronger political commitment to the Convention on Biological Diversity. There is a need to enhance development and wide dissemination of tools for integrating biodiversity, social and economic objectives, and making trade-offs between them. Implementation of the NBSAP and the Convention is needed to be carried out on the ground by supporting activities of local authorities, organizations and communities to work in their local context.

Annex

National Policy, Strategies and Action Plan on the Conservation and Sustainable Use of Biodiversity, 2003-2007

Approved by the Cabinet on June 11, 2002

Rationale

Biodiversity is one of the most important factors in human subsistence. People from all over the world use and consume abundance of species, as food, clothing, housing equipment and medicines. People through the ages have been used many types of ecosystem, such as tropical rain forest, mangrove forest, peat swamps, rivers, bogs and coral reefs.

Thailand is a geographical center of a distinct biogeographic realm and has a high level of species richness, genetic diversity and ecosystem diversity. But during the past century, the unsustainable development and the lack of awareness on the importance and value of biodiversity have led to reduction and loss of such diversity and richness. The rate of biodiversity loss of Thailand is the second highest in Asia.

To implement the Convention on Biological Diversity, Thailand has established its first National Policy, Strategies and Action Plan on the Conservation and Sustainable Use of Biodiversity (NBSAP), 1998–2002, which will be ended in the year 2002. The National Environment Board, hence, had endorsed the formulation of the second NBSAP which will be the guidelines for the conservation and use of Thailand's biodiversity during the period of 2003–2007. NBSAP will be formulated in accordance with the international cooperation in biodiversity and wetlands conservation , the 9th National Economic and Social Development Plan, the government policies, and the Environmental Quality Management Plan.

Status

Thailand has endorsed the Convention on Biological Diversity since 1992. Despite of having not ratified the Convention, Thailand has proceeded following its framework for the country's image and reputation in the environmental conservation, and for the progress in the mitigation of biodiversity loss, which occurs ten times more rapidly than the previous 50 years.

The unsustainable development combined with the economical, political and social and social problems and the rapid population growth since 1961 until 1998, having resulted in the loss of many forest ecosystems. The conversion of forests into agricultural or other specific areas has also eliminated a lot of ecologically important forest areas. The average ratio of forest loss in Thailand is 58,759 hectares per year, or 160 hectares a day.

The long and continuous loss of forest ecosystem has further resulted in the declining population of wild animals and plants. Some significant animal species such as the Asian elephants, wild water buffaloes, and tigers are critically endangered. Brow-antlered deer, Javan rhinoceros, and Kouprey are currently believed to be extinct in the wild. Many wild plants were also disappearing, such as some endemic plant species in the peat swamp forest of Phru To Daeng Wildlife Sanctuary.

The loss of wetland areas, from the change of land use in the Chao Phraya River Basin, has led to the extinction of many freshwater fishes which include *Balantiocheilos melanopterus* and *Platytropius siamensis*. Fifty percent of coral reefs in the Andaman Sea and the Gulf of Thailand were heavily bleached and degraded and large fish species such as rays and sharks are critically endangered.

Hundreds of endemic and wild rice species have become extinct as the result of land conversion into urban areas and the popularity of newly modified rice species. Many native crop plants are also vulnerable from the destruction of plantations. The introduction of exotic animal species has also led to the negligence of some indigenous species such as native ox, Hainan pigs, banteng (*Bos banteng*) and Nakhon Pathom duck, and these species are currently critically endangered.

In an overview, for the next decade, Thailand urgently needs the efforts to promote, facilitate and encourage every appropriate activities/projects to maintain natural ecosystems by reducing biodiversity loss. The country also needs capacity building for personnel on the conservation, collection and dissemination of information through the electronic communication system, researches for use of biological resources. Every Thai citizen especially the students should understand and have the good attitude towards the conservation and sustainable use of biodiversity.

Principles

- * Biodiversity is the national heritage, which has to be conserved and protected for future generation, through the management and sustainable use based on the "Wise Use Concept".
- * Biological resources are natural capital, and their conservation is the investment that will give benefits locally, nationally and globally.
- * Conservation of biodiversity is the most suitable manner possible which include the *in-situ* conservation, alongside with the need for *ex-situ* conservation. Alongside with the recovery of degraded ecosystems, the prevention of threats to biological resources and mitigation of the impacts to biodiversity with concern of indigenous knowledge, innovations and practices.
- * The high-priority elements for the conservation and sustainable use of biodiversity in Thailand are the education and public awareness, capacity building for institutions/organizations and their staffs.

* The research in biological resources and the development of biotechnology have to be fully encouraged, promoted, based on the equitable benefit-sharing principle.

* The implementation of activities on the conservation and sustainable use of biodiversity essentially requires participation of local community and cooperation between various responsible agencies, both at the national and international level.

Vision

Within the next 20 years, Thailand will be one of the leading countries in the conservation, research, and sustainable use of tropical biodiversity.

Objective

To mitigate the loss of biodiversity in Thailand by ensuring that the country has a capacity to protect and maintain biodiversity and to make sustainable use of biodiversity for the best environmental conditions and life-qualities of Thai people.

Main Target

To maintain and conserve ecological process and ecosystems for biodiversity conservation and sustainable use based on the equitable benefit-sharing principle.

Specific targets / indicators

- * Promote the education on the basic knowledge of biodiversity and public awareness in every age-group to the minimum 50% of the entire population in each province and every local administrative organizations, by the year 2007.
- * Encourage the implementation to increase the number of taxonomists for every taxa in government organizations and academic institutions, at least 20 personnel by the year 2007.
- * Develop and harmonize the biodiversity database of every institution/organization. Keep them updated and linked together as "Thailand's Biodiversity Information Network" by the year 2004.

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- * Conserve the forest ecosystems at least 30% of the total area. And additionally recover about 10% of the total area to create "the community forest" and other uses by the year 2007.
 - * Conserve and restore wetlands at least 35% of the total area in the country.
 - * Survey and monitor the biodiversity of plants, animals, insects and micro-organisms in the following protected areas and wetlands, by the year 2007:
 - > The Biosphere Reserves
 - > Western Forest Complex (in the western region)
 - > Eastern Forest Complex (in the eastern region)
 - > Khlong Sang-Khao Sok Forest Complex
 - > Doi Phu Kha-Mae Yom Forest Complex
 - > Songkram River Basin Forest
 - * Proceed the taxonomic studies, collect and conserve the diversity of plants, crops, rice species, herbal plants, microorganisms, fungi and insects by the year 2007.
 - * Survey the presence and distribution of invasive alien species in and surround the protected areas, and develop the measures to control the invasion of alien species, by the year 2007.
 - * Develop "the Biodiversity Conservation Network" which has the unity nationwide, by the year 2007.
 - * Building capacity of the people and local administrative organizations on the conservation and sustainable use of biodiversity at least 40% of the country's total area.
 - * Support the Thai delegates/representatives to participate and negotiate in the international or regional meetings or workshops concerning biodiversity.
 - * Organize at least two international workshops on biodiversity in Thailand.
 - * Nominate the most appropriate sites for biodiversity conservation to the following Convention and Agreement by the year 2007.
 - > At least one site to the Convention on World Heritage
 - > At least one site to the ASEAN Agreement on ASEAN World Heritage
 - > At least twenty five sites to the Ramsar Convention
 - > At least two sites to the Convention on Migratory Species of Wild Animals
 - > At least five sites to the Man and Biosphere Programme
 - * Support the education and improve laws or regulations on the access to biological resources, technological transfer and benefit sharing, by the year 2007.

Policy Statement

To conserve Thailand's biodiversity and to ensure the sustainable use of its components in order to continue the nation's economic and social security and the progress in science and technology development.

Strategies

- * Enhance knowledge, understanding and public awareness in the importance and value of biodiversity.
- * Building capacity and expertise of institutions and their staff on the biodiversity conservation.
- * Strengthen capacity in conservation, restoration and protection of natural habitats, within and outside the protected areas.
- * Increase efficiency in the conservation and sustainable use of species and genetic diversity.
- * Control, regulate, and reduce the threats to biodiversity.
- * Provide incentives and encourage public participation for the conservation of biodiversity in accordance with traditional Thai cultural practices.
- * Promote and develop cooperation between international agencies/institutions in the conservation and sustainable utilization of biodiversity.

Objectives and Actions

*** Strategy 1**

Enhance knowledge, understanding and public awareness in the importance and value of biodiversity.

Objective

To increase awareness and appreciation of the value and importance of biodiversity to general public.

- * Disseminate knowledge and information on the importance of biodiversity to the society and the culture.
- * Develop campaign to raise awareness of the importance and value of biodiversity.
- * Build up the participation in conservation and sustainable use of biodiversity and stimulate the sense of ownership among stakeholder.

Objective

To strengthen knowledge and understanding of biodiversity conservation and sustainable use.

- * Provide knowledge and basic understanding of the importance and need in conserving biodiversity.
- * Strengthen knowledge and basic understanding of biodiversity to those who are "core" in the dissemination of information and biodiversity conservation.
- * Disseminate knowledge and strengthen capacity for local community in the sustainable use of biodiversity.

Objective

To use an education outside the classroom as a tool to raise awareness on biodiversity conservation.

- * Use the formal education system to improve awareness on biodiversity and need in conserving biodiversity.
- * Encourage the development of information sources on biodiversity in local area or natural zone.

*** Strategy 2**

Building capacity and expertise of institutions and their staffs on the conservation of biodiversity.

Objective

To strengthen capacity in taxonomic works for institutions/agencies and their staff.

- * Strengthen national capacity of taxonomic works to facilitate the biodiversity conservation.
- * Establish first priorities to the national taxonomic research, specimen collection and the comparison of the collection with relevant institutions.
- * Enhance taxonomic skill for personnel in institution/organization which needs taxonomic knowledge in conserving biodiversity.
- * Manage to fulfil the taxonomic needs and requirements to facilitate efficient and effective fieldwork and laboratory work.

Objective

To develop human resource capacity for biodiversity conservation.

- * Support training and continuous education in occupations related to biodiversity.
- * Strengthen capacity for NGOs and private sector in biodiversity conservation.

Objective

To develop and strengthen capacity of research institution/organization and their staff in the conservation and sustainable use of biodiversity.

- * Provide financial support and facilities to the research related to biodiversity.
- * Encourage the inventory and monitoring of biodiversity and periodically disseminate the information or the output of such activities.
- * Support the research and development of biological resources for sustainable use.

Objective

To strengthen capacity of institution/organization in the dissemination of data and information which are needed for conserving biodiversity.

- * Build capacity of institution responsible for collecting and dissemination of biodiversity information.
- * Establish the national biodiversity information network to transfer, disseminate and exchange biodiversity data and information.

<p>* Strategy 3</p> <p>Strengthen capacity in conservation, restoration and protection of natural habitat, within and outside the protected areas.</p> <p>Objective</p> <p>To conserve and restore biodiversity in natural ecosystem.</p> <ul style="list-style-type: none"> * Enhance the <i>in-situ</i> conservation, protection, rehabilitation and wise use of wetlands and the upper watercourse areas. * Encourage and support the cooperation, protection and monitoring of activities and use in wetland areas. * Promote the conservation and restoration of biodiversity in the marine and coastal ecosystem. * Integrate biodiversity consideration in agricultural practices. <p>Objective</p> <p>To strengthen the protected areas to ensure their sustainability and their contribution to biodiversity conservation.</p> <ul style="list-style-type: none"> * Conduct national reviews of plan for protected area system to ensure coverage of biodiversity conservation. * Improve and expand legal mechanisms to protect endangered species. * Enhance the efficiency in management of protected areas to be used as the basic knowledge for conservation. <p>Objective</p> <p>To encourage and support research on biological science.</p> <ul style="list-style-type: none"> * Promote and encourage basic and applied research on biological science emphasizing protected area conservation. * Support the education and research emphasizing natural ecosystem conservation. <p>Objective</p> <p>To promote sustainable use within and outside the protected areas.</p> <ul style="list-style-type: none"> * Recognize the vital roles of local communities outside the protected areas (in buffer zones and the vicinity area) as partners in conserving protected areas. * Broaden the support from the public and NGOs in conserving protected areas. * Seek for fund to support for managing the protected areas. 	<p>* Strategy 4</p> <p>Ensure the efficiency in conservation and sustainable use of species and genetic diversity.</p> <p>Objective</p> <p>To improve capacity to conserve species and genetic diversity in natural habitats.</p> <ul style="list-style-type: none"> * Conserve the habitats containing viable populations of economically important genetic resources and promote the effective agriculture for sustainable use. * Promote sustainable agricultural system for conserving and sustainable use of genetic diversity. * Increase capacity in genetic resources conservation of crop, medicinal, indigenous and wild plants, and livestocks and on-farm conservation. * Amend, improve and revise legislative mechanisms to protect species and genetic diversity. * Improve basic knowledge of biological science by support the research emphasizing species and genetic resources conservation. <p>Objective</p> <p>To improve the capacity of <i>ex-situ</i> conservation to enable biodiversity conservation, promote public education, and support sustainable development.</p> <ul style="list-style-type: none"> * Develop microbial culture collection centers as <i>ex-situ</i> network. * Strengthen and support gene banks, seed banks and plant breeding centers to ensure the protection and exchange of plant and animal genetic resources. * Develop botanical gardens as a network for conserving wild plant resources. * Strengthen the roles of zoos, wildlife breeding centers, aquarium and aquatic animal breeding stations in the conservation of biodiversity. * Extend the roles of <i>ex-situ</i> conservation to include reintroduction into the wild. * Improve the capacity of <i>ex-situ</i> conservation through the support of relevant research.
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<p>* Strategy 5</p> <p>Control, regulate and reduce the threats to biodiversity.</p> <p>Objective</p> <p>To ensure the effective regulation and management for biosafety.</p> <ul style="list-style-type: none"> * Increase understanding on the use of genetically modified organisms (GMOs) resulting from modern biotechnology which is likely to have adverse impacts on the conservation and sustainable use of biodiversity. * Develop biosafety clearing house mechanism, in order to create linkage with relevant national and international institution/organization. * Improve capacity in regulations, policy and administration to control transfer handling and use of GMOs, under the Biosafety Protocol. * Improve capacity in the monitoring and risk assessment of GMOs. <p>Objective</p> <p>To prevent and control invasion of alien species which are likely to affect the change of biodiversity.</p> <ul style="list-style-type: none"> * Increase understanding on the impacts of invasive alien species to biodiversity. * Provide additional legislative mechanisms in introduction, control and eradication of invasive alien species. * Control, regulate, eradicate and monitor alien species that threaten biodiversity. <p>Objective</p> <p>To enable effective protection of biodiversity.</p> <ul style="list-style-type: none"> * Provide specific protection for endangered, rare and endemic species. * Conduct biodiversity impact assessment especially for projects in the protected areas and wild lands. * Control and reduce pollution from their sources to maintain the quality of water in natural ecosystems. 	<p>* Strategy 6</p> <p>Provide incentives and encourage public participation for the conservation of biodiversity in accordance with Thai traditional cultural practices.</p> <p>Objective</p> <p>To use economic incentives in the promoting of conservation and sustainable use of biodiversity.</p> <ul style="list-style-type: none"> * Use the benefits from implementing ecotourism as the economic incentive in the conservation and sustainable use of biodiversity. * Increase incentives for communities to conserve public lands that are biologically diverse. * Develop and publicize roles of medicinal and traditional herbs, and ensure appropriate and sustainable use of herbs. <p>Objective</p> <p>To integrate biodiversity conservation into the traditional lifestyle and local customary practices.</p> <ul style="list-style-type: none"> * Support maintenance of traditional culture practices in biodiversity conservation. * Enhance awareness on the value of indigenous knowledge and biological resources. * Support community rights to protect and sustainable use of local biological resources. <p>Objective</p> <p>To support the roles of private sector in implementing biodiversity conservation programs.</p> <ul style="list-style-type: none"> * Provide incentives for conservation to private firms or organizations implementing biodiversity conservation program * Support the conservation of wild lands to maintain biodiversity. <p>Objective</p> <p>To ensure biodiversity conservation throughout the urban and rural environment.</p> <ul style="list-style-type: none"> * Promote the conservation of biodiversity in accordance with the rural communities. * Promote the maintenance of natural conditions in tourist attractions, workplaces and public areas.
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<p>* Strategy 7</p> <p>Promote and develop international cooperation and collaboration in the conservation and sustainable use of biodiversity.</p>	<p>Objective</p> <p>To enhance international cooperation in the conservation and sustainable use of biodiversity.</p> <ul style="list-style-type: none"> * Promote cooperation with the international agreements related to biodiversity. * Support the joint works or activities in the South East Asian Region and Mekong River Basin Sub-Region to conserve biodiversity. * Encourage active participation of Thailand in the international forum/meetings related to biodiversity conservation. * Enhance the international cooperation on biodiversity conservation as a tool in the economic recovery, tourism promotion and the country's fame. * Accelerate Thailand's role in the international cooperation for the progress in science, technical and technology related to biodiversity. 	<p>Objective</p> <p>To progress towards good reputation of the country on biodiversity conservation in the global environmental conservation forum.</p> <ul style="list-style-type: none"> * Nominate the appropriate protected areas to be the World Heritage Site under the Convention on World Heritage, and to be the ASEAN Heritage Parks and Reserves under the ASEAN Working Group on the Nature Conservation and Biodiversity (AWGNCB). * Nominate additional wetland areas to be the Ramsar Sites under the Ramsar Convention, and to be the Anatidae and Shore Bird Network under the Convention on Conservation of Migratory Species of Wild Animals. * Nominate additional eligible sites to be the Biosphere Reserves under the Man and Biosphere Program. * Support the establishment of Transboundary Reserves. 	<p>Objective</p> <p>To ensure the benefits from the access to biological resources, transferring of technologies and information sharing with other countries.</p> <ul style="list-style-type: none"> * Ensure equitable and fair sharing of benefits derived from the use of biological resources on basis of sustainable use, in accordance with the Convention on Biological Diversity. * Promote international cooperation on access and transfer of technologies on the conservation and sustainable use of biodiversity. * Develop the National Clearing House Mechanism (CHM) to disseminate and exchange biodiversity information, both at the national and international level.
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Acronyms

ARCBC	ASEAN Regional Centre for Biodiversity Conservation
BDM	Thailand's Biodiversity Data Management
BIOTEC	National Center for Genetic Engineering and Biotechnology
BRT	Biodiversity Research and Training Program
CBD	Convention on Biological Diversity
COP	Conference of the Parties
DOA	Department of Agriculture
DOAE	Department of Agricultural Extension
DOF	Department of Fisheries
DOLD	Department of Livestock Development
FDA	Food and Drug Administration
FFI	Fauna & Flora International
GEF	Global Environmental Facility
GIS	Geographic Information System
GMOs	genetically modified organisms
GTI	Global Taxonomic Initiative
IBC	Institutional Biosafety Committees
IUCN	World Conservation Union
MOU	Memorandum of Understanding
NAREBI	Natural Resources and Biodiversity Institution
NBC	National Biosafety Committee
NBCRC	National Biological Control Research Center
NBRU	National Biodiversity Reference Unit
NEB	National Environment Board
NGOs	Non-government Organizations
NSTDA	National Science and Technology Development Agency
OEPP	Office of Environmental Policy and Planning
RFD	Royal Forest Department
SBSTTA	Convention's Subsidiary Body on Scientific, Technical and Technological Advice
TBC	Thailand Biodiversity Center
TISTR	Thailand Institute of Scientific and Technological Research
UNEP	United Nations Environment Programme
WCMC	World Conservation Monitoring Center
WWF	World Wildlife Fund for Nature

National Report on the Implementation of Convention on Biological Diversity : Thailand

Available from	Biological Resources Section Natural Resources and Environmental Management Division Office of Environmental Policy and Planning (OEPP) Ministry of Science, Technology and Environment 60/1 Soi Phibul Wattana 7, Rama VI Rd., Bangkok 10400 THAILAND Telephone (622) 2795202, 2798088, 2797180, 2797186-9 ext. 226, 227 Facsimile (622) 2713226, 2713251
Copyright	2002 Office of Environmental Policy and Planning No use of this publication may be made for resale or other commercial purpose
Citation	Office of Environmental Policy and Planning. 2002. <i>National Report on the Implementation of Convention on Biological Diversity</i> . Ministry of Science, Technology and Environment, Bangkok, Thailand. 60 p.
ISBN	974-90615-0-0
Printing	September 2002
Supervised by	Working Group on the National Report on Implementation of the Convention on Biological Diversity
Edited by	Sirikul Bunpapong
Photographed by	Advanced Thailand Geographic Magazine
Designed & Printed by	Integrated Promotion Technology Co., Ltd. Telephone (662) 5852076, 5860837, 9137761-2