

Access and Benefit Sharing Relating to Forest Genetic Resources and Traditional Knowledge in Thailand

Aniwat Chalermpongse

Senior Research Scientist, Division of Forest Environment Research and Development, Forestry Research Office, Royal Forest Department, Jatujak, Bangkok

1.0 Introduction

The purpose of this article is to report on access and benefit sharing relating to forest genetic resources and the traditional knowledge of local people under Thailand's forest laws and related regulations.

2.0 Background Information

Thailand is a Southeast Asian Country with 76 provinces (Changwat), 794 Districts (Amphur), 101 Subdistricts (King-Amphur), 7,255 Counties (Tum-bon) and 65,601 Villages (Mu-ban). Geographically, it is divided into six regions: the central, north, north-east, east, west and the south.

Thailand has a population of about 60 million, about the size of France. About seventy-five percent of the people live in rural areas. The remaining twenty-five percent are clustered mainly in Bangkok. Bangkok is the capital and the centre of social, commercial, cultural and political life. Seventy percent of the labour force is engaged in agriculture, forestry, hunting and fisheries. Women make up about forty-nine percent of the labour force.

At least eighty percent of the population is from Thai stock. The principal minority group is an estimated three million ethnic Chinese located in the larger urban areas; about one million Malay-speaking Muslims in the southernmost provinces; approximately five hundred thousand hill tribesmen in the north and three thousand Vietnamese, mostly in the north-east. Westerners form a small minority group of about fifteen thousand.

Buddhism has long been the religion of most Thai people (about 95%). Buddhism permeates the arts, literature, education and the Thai way of life, especially in areas where the majority of the residents embrace the Buddhist faith. About four percent of the population is Muslim, while less than one percent is Christian. According to the Constitution, and in practice, H.M. the King upholds and supports all religions, that is, all religions professed by the Thai people.

2.1 Biogeography and climatography

The Kingdom of Thailand is located in Southeast Asia. It covers the latitudes between 6-20 degrees north. It covers a large part of the Indo-Chinese and Sundaic biogeographic sub-regions. It shares borders with several other sub-regions. The range of altitude is from sea level up to 2,500 metres.

Climatic conditions vary from the lowland humid zones to the alpine and/or the sub-tropical zones. The country has a tropical climate with a high degree of humidity. The average temperature is 28.9 degrees Centigrade. Thailand has three seasons: hot (March-May); rainy (May-October); and cool (November-February).

Thailand is rich in biodiversity. Its location endows the Kingdom with many terrestrial and aquatic habitats. These contain approximately seventy percent of the total global number of plant (10,000), animal (12,000) and microbial (20,000) species (Anon., 1993). Forty-two ethnic groups are found in Thailand (Grimes, 1974).

Unfortunately, human interference and economic pressure have caused a large part of the terrestrial, freshwater and marine ecosystems to be destroyed. The Kingdom's biological resources, particularly its forest resources, have been particularly degraded. This is especially problematic because forest areas comprise only 131,485 square kilometres or about 25.62 percent of the country's total terrestrial area (RFD, 1996). Table 4 shows the population, land area and forest area of Thailand and other Southeast Asian countries.

Country	Population (millions)	Total land area (km²)	Forest area (km²)	% of the whole country
1. Brunei Darussalam	0.3	5,765	3,230	56.03
2. Burma (Myanmar)	45	657,740	319,570	48.59
3. Cambodia	7	176,520	126,550	71.69
4. Indonesia	200	1,911,600	1,188,130	62.15
5. Laos	4	230,800	136,360	59.08
6. Malaysia	20	328,600	210,220	63.97
7. Philippines	65	299,400	102,400	34.20
8. Singapore	2.8	570	1	0.18
9. Thailand	60	513,115	131,485	25.62
10. Vietnam	70	325,360	103,140	31.70
GRAND TOTAL	474.1	4,449,470	2,321,086	52.17

Sources: Luangjame, et. al. (1997); Charupatt (1993); Collins, et. al. (1991).

Thailand is one of the richest countries in the world for bio-resources (Luangjame et al. 1997). This is due to its bio-geographical location at the junction of three main floristic regions, namely the Indo-Burmese, the Indo-Chinese and the Malaysian regions. The Indo-Burmese floristic region is in the northern, north-western and western parts of the country. The Indo-Chinese floristic region is in the north-eastern part. The Malaysian floristic type is found in the southern peninsula and in the eastern and western parts of the country.

Thailand has a tropical climate. It is controlled strongly by the Indian and Pacific Oceans and the Siberian mainland. Mean annual rainfall in the country ranges between 1,000 and 3,500 mm. The temperature range is 20-33oCentigrade (Viriyabuncha, 1992).

Table 5 shows the land-use classification in Thailand. The Kingdom's total land area is 513,115 square kilometres. About twenty-five percent of the country is forestland. Agricultural lands occupy about forty percent of the country. Of this, about two percent is dedicated to housing; about fifty-two percent is used for

paddy land; about twenty four percent is used for field crops; sixteen percent is used for fruit tree crops. Other uses comprise another four and a half percent of land area. Unclassified land represents about thirty-three percent of the total (RFD, 1996).

Table 5: Land-use Classification in Thailand		
Classification	Ownership areas (km²)	Whole Kingdom (%)
Total land of Kingdom	513,115.02	100
Forest land	131,485.00	25.62
Agricultural ownerships	210,033.44	40.93
Housing area (2.65%)	5,562.14	1.08
Paddy land (52.06%)	109,338.51	21.31
Field crop area (24.55%)	51,565.00	10.05
Fruit tree crop area (16.00%)	33,598.24	6.55
Vegetable and flower area (0.71%)	1,489.86	0.29
Livestock farm area (0.57%)	1,189.77	0.23
Idle (bare) land (2.47%) (grass, paddy and field crops lands cannot grow any crops, waiting for sale and to make profit)	5,182.16	1.01
Other land (1.00%) (Roads, sidewalks, ditches, hatcheries, ponds in the farms)	2,107.76	0.41
Unclassified land (Including reservoirs, dams and degraded national reserved forests waiting to be rehabilitated)	169,560.60	33.05

Source: RFD (1996)

3.0 Thailand's Biodiversity

3.1 *Ecosystems of Thailand*

Thailand is dominated by twelve terrestrial and forest ecosystems. These are tropical evergreen forest, dry dipterocarp forest, mixed deciduous forest, mangrove forest, pine forest, scrub or savannah or grassland forest, peat swamp forest, beach forest, para-rubber plantation, forest plantation, agricultural land and unclassified land. Table 6 shows the classification of the terrestrial and forest ecosystems in Thailand. A brief description of some of these ecosystems and Thailand's aquatic and marine ecosystems follows.

Ecosystem	Area (km ²)	% of the country
1. Tropical evergreen forest	67,861	13.23
2. Dry dipterocarp forest	48,930	9.54
3. Mixed deciduous forest	33,929	6.61
4. Mangrove forest	2,872	0.56
5. Pine forest	2,162	0.42
6. Scrub/Savannah/Grassland forest	846	0.16
7. Peat swamp forest	640	0.12
8. Beach forest	No assessment	No assessment
9. Para-rubber plantation	15,850	3.09
10. Forest plantation	8,698	1.70
11. Agricultural land	210,033	40.93
12. Unclassified land	169,560	33.05

Source: RFD (1996)

The mixed deciduous forest contains moderate to low species diversity. However, this type of forest is the most valuable forest in Thailand, because it is particularly rich in highly valuable teak (*Tectona grandis* Linn. f.). This forest occurs mainly in the north.

Mangrove forest occurs along the muddy river mouths, along the coastlines of the Andaman Sea and the Gulf of Thailand. The area of mangrove forest has declined rapidly due to conversion to aquaculture farms and from infrastructure development.

Pine forest is found mainly in the north and north-east at the Korat Plateau. Pine grows along the ridges and dry steep slopes ranging from 700-1,500 metres. *Pinus kesiya* Royle ex Gordon occurs abundantly here.

Peat swamp forest is a lowland freshwater swamp that occurs with inland swamps near the seashore where there is high humidity and high rainfalls. About four hundred and twenty species of plants occur in Thailand's peat swamps.

Scrub forest includes natural grassland, savannah forests, rangelands and upper montane forests. Small trees, bushes and grasses dominate it.

Three natural freshwater lakes dominate the freshwater ecosystems in Thailand. The important freshwater ecosystems are Kwan Phayao in the north, Nong Harn in the north-east and Bueng Boraphet Lakes in central Thailand. These provide important habitat for freshwater animals, but are threatened by sedimentation and logged-over harvesting. Thailand has forty-four rivers found throughout the country. Those in the central region face significant pollution problems.

Marine ecosystems in Thailand consist of mangrove forest, saline lakes, coral reefs, sea grass beds and off-shore ecosystems.

Songkhla Lake is the only saline lake in Thailand. It stretches along the Phattalung, Nakhon Sri Thammarat and Songkhla Provinces. Its northern part has freshwater, but saline water dominates the central and southern parts.

The coral reefs, sea grass beds and offshore marine areas are important for fishery production. Coral reefs and sea grass beds are particularly important as fishery nursery grounds. Sediments from freshwater run-off and human activities, such as dynamite fishing and anchoring, have affected them.

The beach forest is located in very small areas along Thailand's seashores. Very little research has been undertaken to study this forest type. The dominant trees

are *Casuarina equisetifolia* and *C. junghuhniana*. Beach forest is very important for village woodlots. It also protects seashores.

Para-rubber plantations are mostly planted in south and north-east Thailand. It is very important for para-rubber-oil tapping production. Old plantations are felled for timber used in furniture making. This kind of wood is important for the export furniture manufacturing that takes place in Thailand.

Forest plantation is dominated by planted species such as teak (*Tectona grandis* Linn. f.) and eucalyptus (*Eucalyptus camaldulensis* Dehn.). Nearly one hundred species of wood trees grow in disturbed forest areas around the country. The local people living near the eucalyptus plantations collect many species of mycorrhizal mushrooms for food. Wood chips and fuel woods are harvested to produce pulp and paper. Charcoal is made from *Eucalyptus camaldulensis*. Some of the wood chips are exported to foreign countries like Japan and Taiwan.

3.2 Species richness and endemism

3.2.1 Plants

Plant species diversity is high in Thailand (see Table 7). Thailand has about 20,000 or 8 percent of the world total (Smitinand, 1995). Thailand has at least 10,000 species of vascular plants and 1,000 orchids. At least 450 medicinal plant species have been enumerated. About 800 species have been introduced to the Kingdom.

Table 7: Global and Thailand Known and Expected Species Diversity				
	Species Biodiversity			
Organisms	Global		Thailand	
	no. known species	no. expected species	no. known species	no. expected species
Plants	247,529	285,550	9,825(4.0%)	17,025
Monocots	170,000	190,000	6,270(3.7%)	10,000
Dicots	50,000	60,000	2,387(4.8%)	5,000
Conifers	529	550	25(4.7%)	25
Ferns	10,000	11,000	633(6.3%)	1,000
Mosses & Liverworts	17,000	24,000	500(2.9%)	1,000
Animals	841,000	10,046,100	11,294(1.3%)	55,000
Fishes	19,000	23,000	2,600(13.7%)	3,000
Birds	9,000	9,100	980(10.9%)	1,000
Mammals	4,000	4,500	295(7.4%)	500
Reptiles & Amphibians	9,000	9,500	419(4.7%)	600
Insects	800,000	2-10,000,000	7,000(0.9%)	50,000
Micro-organisms	179,000	2,350,000	19,087(10.7%)	83,000
Algae	40,000	60,000	4,000(10.0%)	20,000
Protozoa	30,000	100,000	1,000(3.3%)	15,000
Nematodes	15,000	500,000	137(0.9%)	7,500
Bacteria	3,000	30,000	2,000(66.7%)	3,000
Viruses	5,000	130,000	550(1.0%)	2,000
Lichens	17,000	30,000	300(1.8%)	5,000
Fungi	69,000	1,500,000	3,000(4.3%)	30,000
Total	1,267,529	3-50,000,000	40,196(3.1%)	155,125

Sources: Hawksworth and Mound (1991); Chalermpongse (1995); Wilson (1988); Groombridge (1992)

Habitat destruction has endangered about 100 species. About 1,000 species are considered rare. It is believed that some species found in the upper moist deciduous forests are particularly vulnerable. Several lowland commercial tree species are either threatened or endangered.

3.2.2 Animals

About 850,000 animal species have been described worldwide. It is estimated that about 12,000 are described in Thailand, or about 1.3% of the world total. About 55,000 species are expected in Thailand or about 6.5% of world total. In Thailand, there are 295 species of mammals, 2,600 fishes, 980 birds, 419 reptiles and amphibians and 7,000 insects.

Because Thailand lies where the Indian and Malayan Realms meet, the number of endemic species is not as high as in Malaysia or Indonesia. Only 90 species are considered endemic. Some 234 species have been introduced. Habitat destruction has endangered 109 species and 181 species are considered rare.

3.2.3 Micro-organisms

About 180,000 microbial species have been described worldwide. It is estimated that about 20,000 species are described in Thailand, or 10.7% of world total. About 85,000 species or about 47.2% of world total are expected in Thailand.

In Thailand, there are 4,000 described species of algae, 1,000 protozoa, 137 nematodes, 2,000 bacteria, 550 viruses, 300 lichens, and 3,000 fungi.

Of the microbial species in Thailand, an unknown but probably large number may be extinct. About 100 species are endangered and about 150 species are considered rare because of habitat destruction.

3.3 Threats to biodiversity

The country's diverse ecosystems and biological resources are threatened alarmingly both in quantitative and qualitative terms.

Forest destruction from 1961 to 1996 was 53.3% to 25.62% or about 4,056 square kilometres a year. Over half of the national forest reserve is gone. Only national parks (64 terrestrial parks, 15 marine parks and 42 proposed parks) forest parks (47 parks), wildlife sanctuaries (38 sanctuaries), non-hunting areas (48 units),

wildlife parks (2 parks), watershed conservation areas (177 units on 25 rivers), botanic gardens (14 gardens) and arboreta (46 arboreta) now succeed in conserving biodiversity.

A combination of increased population, poor land-use and national social and economic development policies pressures habitats and species. Population and economic growth result in greater pressures on land tenure and forest resources. Forests are illegally logged and converted to agricultural lands, mining areas and plantations. Often such activities make land unproductive for other purposes.

Land tenure and traditional rights issues are often ignored to the detriment of sound land management. Programmes aimed at increasing food production and alleviating population pressure (e.g., resettlement programmes) have deforested many areas and have opened up new lands. Soil erosion, reduced soil fertility and lost biodiversity follow. Human activities have destroyed, and continue to destroy, large natural forest areas.

Species biodiversity is threatened by habitat loss. The emphasis on forestland distribution and conversion to agriculture is not always ecologically sound, especially in rich forests.

Emphasising the cultivation of new high yielding crops may lead to the loss of indigenous cultivars. Genetic diversity will be reduced.

Shrimp farming, pollution and degradation threaten marine habitats, mangrove forests and wetlands. Both over-fishing and the use of harmful fishing techniques, such as dynamiting, poisoning and using small-scale nets also threaten marine biodiversity.

Wetlands and coastal ecosystems are especially vulnerable to environmental changes outside their immediate boundaries. Industrial and domestic wastes pollute rivers, wetlands and coastal habitats. This reduces and destroys biodiversity. Suburb banks, important sources of clean water and freshwater fisheries, are contaminated by sedimentation from forest clearance, fertiliser runoff and industrial effluents.

Rainforests are some of the most important habitats from a conservation point of view. The greatest species richness is concentrated in rainforests below 350 metres down to mean sea level.

Government policies can distort incentives to utilise biological resources efficiently. Reforms are needed to remove distorting subsidies, perverse incentives

and institutional failures and to re-establish the linkage between resources scarcity and resources prices.

The absence of property rights, under or unpriced biological resources and the public goods nature of biodiversity are the most commonly cited market failures that lead to biodiversity loss. Markets fail to function when individuals exploiting biological wealth have no economic incentives to take into account the preferences of society at large that values biodiversity's existence.

A certain level of biodiversity loss is an inevitable consequence of human activities. The question is not how to eliminate this loss altogether, but how to minimise it and conserve the diversity of biological resources at a level consistent with the consent of the majority of the nation's people.

4.0 Biodiversity Conservation Measures in Thailand

Conservation can bring considerable and sustainable benefits to local communities and the nation as a whole (Boyle and Boontawee, 1995). But conserving biological diversity requires financial investment, staff, infrastructure, the postponing of immediate or short-term benefits, education and research.

Current conservation programmes are usually implemented through resource management agencies whose budgets are generally insufficient to implement their mandates effectively. To produce acceptable results and to become fully operational, conservation agencies must have sufficient and reliable sources of support.

The protected areas and natural ecosystems they contain are subject to some degree of control and protection in every country of the world. Many different legal and administrative mechanisms are employed by the governments to manage natural habitats for conservation of biodiversity. Protected area systems are central to such management.

Table 8.0 presents the different protected area categories that make up the protected area system in Thailand. The total size of Thailand's protected area system is estimated to be 425 units. This represents about twenty-one percent of the whole Kingdom.

Protected area systems	Units	Area in 1996 (km²)	% of country	% of protected area
1. National parks	82	24,332.51	4.74	26.21
2. Forest parks	57	761.73	0.14	0.82
3. Wildlife sanctuaries	42	30,784.41	6.00	33.16
4. Non-hunting areas	50	4,249.03	0.82	4.57
5. Watershed conservation areas	177	31,552.00	6.14	34.00
6. Wildlife parks	2	24.55	0.004	0.02
7. Botanic gardens	14	56.25	0.01	0.06
8. Queen Sirikit botanic garden	1	9.6	0.001	0.01
9. Arboreta	47	28.24	0.005	0.03
10. Biosphere reserves	4	600.41	0.11	0.64
11. World heritage sites	4	3 cultural and 1 natural sites		
12. Mangrove conservation	1	428.0	0.08	0.46
Total	481	92,827.16	18.05	100.00

Source: RFD (1996)

4.1 Laws and institutions overseeing biodiversity conservation

The Royal Forest Department of Thailand (RFD) was established about 100 years ago on 18 September 1896 by the Great King Rama the Fifth of the Chakri Dynasty. Its main function is to conserve and develop national forest resources by applying sustainable and multiple-use management techniques.

Forest administration is controlled by five forest laws and other regulations employed for forest administration. These are:

1. Forest Act (1941) (B.E.2484 and revised)
2. Wildlife Preservation and Protection Act (1960) ((B.E.2503), revised in 1992 (B.E.2535))
3. National Park Act (1961) ((B.E.2504), and revised in 1964 (B.E.2507)
4. National Forest Reserve Act (1964) ((B.E.2507) and revised)

5. Forest Plantation Act (1992) (B.E.2535)
6. Community Forest Act (during processes to the National Assembly Approval); and (to be enacted in the near future)
7. Decree on Administration of the Royal Forest Department, Ministry of Agriculture and Co-operatives (1992) (B.E.2535)

Additional laws on biodiversity conservation in Thailand are:

1. The Elephant Conservation Act (1900)
2. The Fishery Act (1947)
3. The Plant Quarantine Act (1964)
4. The Plant Protection Act (1992)
5. The National Environment Quality Promotion and Conservation Act (1992)
6. The Plant Reservation Act (1999)

In 1989, the Government of Thailand declared a logging ban throughout the Kingdom.

Current efforts to conserve biodiversity are restricted by government policies, legislation and institutional conflicts. It is important for Thailand to ensure smooth management of biodiversity among governmental organisations and non-government organisations (NGOs).

The Ministry of Agriculture and Co-operatives and the Ministry of Science, Technology and Environment have created many committees to deal with the Convention on Biological Diversity (CBD). The main organisations dealing with the CBD are the RFD, Department of Fisheries (DOF), Department of Agriculture (DOA), Department of Livestock (DOL), Office of Environmental Policy and Planning (OEPP) and the National Centre for Genetic Engineering and Biotechnology and Environment (NCGEBE).

Several universities have also become involved in biodiversity issues. These include Kasetsart University, Chulalongkorn University, Mahidol University, King Mongkut's Institute of Technology, Chaing Mai University, Prince of Songkhla University and Konkaen University. NGOs are also very actively involved conserving biodiversity in Thailand. These include the Thailand Development Research Institute (TDRI), the Thailand Environment Institute (TEI) and the Wildlife Fund Thailand (WFT).

4.2 Legislation and regulations on access to genetic resources

4.2.1 Regulation of the Office of the Prime Minister on Conservation and Use of Biological Resources

During 1993 and 1994, the Working Committee on Genetic Resources under Thailand's National Committee on the Convention on Biological Diversity, held a number of discussions on the legal aspects of the access issue. Towards the end of this work, the Working Committee, which is chaired by Dr. Ampon Senanarong, the Privy Councillor, drafted a "Regulation of the Office of the Prime Minister on Conservation and Use of Biological Resources". This Regulation was subsequently passed by the Cabinet on 17 January 2000.

The Regulation has principles, conditions and instructions for drafting access contracts to ensure fair and equitable benefit sharing when genetic resources are used. It aims to provide a formal system to thoroughly inform a co-ordinated institution and related organisations on access to genetic resources. Thus, it ensures that access and benefit sharing are conducted fairly and equitably. The co-ordinated institution established by the regulation will be named the "Biodiversity Centre". It will operate under the National Science and Technology Development Agency (NSTDA). The regulation is now being submitted to the cabinet for approval.

4.2.2 Regulation of the Royal forest Department on Access and Benefit Sharing in Studying and Research in Forestland and Protected Areas 1999

The RFD is the primary biodiversity conservation institution in Thailand because it oversees forests, the major repository of biodiversity in the country. The RFD is also drafted the "Regulation on Access to Genetic Resources and Benefit Sharing in In Situ and Ex Situ Forest Conservation Areas". This regulation was passed by the Royal Forest Department in August 1999 as the "Regulation of the Royal forest Department on Access and Benefit Sharing in Studying and Research in Forestland and Protected Areas 1999". The regulatory framework is summarised in Box 14.

BOX 14: Summary of Proposed Regulatory Framework in the Draft Regulation on Access to Genetic Resources and Benefit Sharing in In Situ and Ex Situ Forest Conservation Areas

- Access to surveys, research, seminars, conferences, workshops, training, audio-visual materials and to collect or use genetic resources must be disclosed to and considered by the Royal Forest Department (RFD) Biodiversity Committee before it is approved by the RFD General Director.
- The collector, and if applicable the principal for whom the collector is an agent, enterprise or company, must disclose its intentions to the RFD and the affected regional or local administrations for consideration and authorised approval.
- All Thai citizens and Thai governmental entities must have access to collected specimens and relevant data for research and studies whenever specimens are deposited in Thailand. A duplicate must be deposited at the RFD.
- An agreement on royalties to be paid to the RFD must be made in case commercial use is derived from the resources taken. Where appropriate, other forms of compensation may be negotiated.
- A provision must be included to allow the RFD to unilaterally terminate the agreement whenever the collector has violated any terms or laws. The public interest or welfare may also be grounds to terminate the agreement.
- A fee must be paid to the RFD according to a fee schedule formulated by the RFD.
- A full project proposal must be submitted to the RFD for approval. A progress report must be submitted every four months during the work term.
- The maximum term for an agreement can be one year, three years, five years or more, provided each agreement can be reviewed annually to determine compliance with its terms.
- Where the collector or its principal is a foreign legal or natural person, the agreement must stipulate that scientists who are Thai citizens and who work in the accredited Thai institutions shall be actively involved in the research and collection process. Foreign collectors or their principals must obtain from the National Research Council of Thailand a certificate to permit work or research before hand.
- If a commercial product is derived from biological or genetic resources endemic to Thailand, fair and equitable benefit sharing must be negotiated and included in the agreement.
- A list of species and the amounts to be collected must be declared.
- Three duplicates of the final report should be submitted to the RFD not more than one year after the final term of the agreement ends.

5.0 Forest Resources Management, Rural Communities and Conflicting Interests

There is growing awareness that rural community participation in forest resources management can help to protect forest areas and promote rural development.

The multiple demands on forest resources in a developing country like Thailand often result in opposing and competing interests coming into conflict over user and tenure rights of forest resources. Often times NGOs, local communities, governments and concessionaires have varying views on how forest resources should be developed and utilised.

Forestry and natural resources professionals increasingly have to mediate between these various stakeholders. To solve conflicts they need to:

- anticipate and understand conflicts before they arise;
- be skilled in conflict resolution concepts;
- provide participants with opportunities to exchange ideas and experiences in the conflict resolution process; and
- promote local people's participation in benefit sharing when forest resources are used and conserved.

The key to successfully managing a protected area is to involve actively the communities living in or near protected areas. To do this protected area managers require new skills and techniques to foster and maintain the participation of local communities. These professionals need to be able to plan strategies and implement projects with local communities, and be able to communicate effectively with local communities.

Many natural resources conflicts vary in origin, intensity and a combination of other factors. Various environmental, economic, social, political, legal and historical factors combine to influence natural resource use. Government policies on natural resource use, the economic values associated with natural resources, the size and capacity of the resource and trade laws are also factors. With multiple interests, and a limited and diminishing resource base, natural resource conflicts are increasing in frequency.

Forests provide multi-purpose uses to humans and communities, for example, wood and non-wood products, water, wildlife, recreation, forage, air, wilderness environment, food and medicine. Human needs consist of food, clothing, shelter, medicine and tertiary products. These exist already in forests.

More than sixty percent of Thailand's rural population, or over 40,000 communities, continues to rely on natural resources to satisfy some of their food needs. About one million families of hill tribal people and forest dwellers live under rudimentary conditions and insufficient food supply. Food hunted or collected from the forests and adjoining areas constitutes a significant component of their diet.

For these people natural food comes in two major groups: natural vegetables and mushrooms. Several plant parts are used in daily consumption including roots, tubers, shoots, stems, leaves, bark, flowers, buds, fruits, seeds, seed pods and seedlings. They are usually used as fresh or boiled vegetables.

More than five hundred species of edible plants have been listed as being available in Thai markets. Thai people have been known to use about 180 native species of edible plants and 50 species of edible mushrooms from the north and north-east. In the north-east, natural food accounts for as much as one half of the total food consumption of some villagers.

In Thailand, only about 60-70 percent of the population uses modern health services. The rest rely on traditional remedies based on medicinal plants. More than one thousand medicinal plants species are used including trees, shrubs, climbers, fungi and herbs. Hundreds have a commercial value. Some species are reported to have economic potential in drug production. Drugs are derived from various parts of the plants including fruits, flowers, leaves, stems, barks, branches or twigs, roots, gums and resins.

The most important biologically active compounds are the alkaloids, followed by other classes of compounds such as terpenoids and saponins. More than 1,000 medicinal plant species have been screened and studied by Mahidol University. Aromatic plants, bamboo (12 genera, 60 species), rattan (6 genera, over 50 species), lac, gum, dammar, resin and bee products are some of the other important minor forest products. Bee products are particularly interesting with six derivative products:

- Honey (used as a food or sweetener in many industrial food products);
- Wax (used in polishes, cosmetics and candles);
- Pollen (used as a dietary supplement and in herbal medicines);
- Royal jelly (used as a food component or supplement and considered to be an aphrodisiac and rejuvenator);
- Propolis (used medically on a small scale for its bactericidal properties); and

- Bee venom (used medically for desensitising people who are hyper-allergic to bee stings, and as folk medicine to prevent arthritis).

6.0 The Need for a New Forestry Partnership

The practice of scientific forestry in Thailand began with the founding of the RFD and the subsequent developments have a long history (Anonymous, 1993). Thailand's forest policies are summarised in Box 15.0.

BOX 15: Thailand's Forest Policies

Policy objectives

- To stop the destruction of the remaining natural habitats and biodiversity, and to reverse the current trend.
- To rehabilitate deteriorated watersheds.
- To promote social justice and equity in forest-based products from domestic sources.
- To meet most of the national needs for forest-based products from domestic sources.
- To help to increase the income of the rural communities and strengthen the national economy.
- To support international efforts to control global warming, the greenhouse effect and global climatic changes.

Policy on land management for forestry

- The State will support rural industries and processing based on non-wood forest products.
- The country will aim for self-sufficiency in most wood-based products by the year 2010.
- Import of unprocessed wood will be licensed, and exports of roundwood will be banned.
- Processing and in country transport of raw material and products will be deregulated.
- Effective safeguards will be adopted by existing and new industries to protect the environment.

continued on the next page

BOX 15: Thailand's Forest Policies

continued from the preceding page

Policy on the development of forestry sector institutions

- The forestry sector policy will be up-dated regularly and used as the basis for incorporating the forestry sectoral plan in the National Economic and Social Development Plan.
- Legislation, including the rules and regulations of all executing state agencies, will be made and kept consistent with the forestry sector policy.
- The principles of decentralisation will be applied in the forestry sector, and bottom-up planning and decision-making mechanisms will be developed.
- The state will support “grassroots” organisations in their efforts to promote equitable rural development.
- Academic, research and other institutions in the forestry sector will co-ordinate their work to support the implementation of the forestry sector policy.

Policy on extra-sectoral concerns

- The State will view all sectoral policies holistically and neutralise land-use, agricultural and other policies that promote deforestation.
- Substitution and non-wasteful utilisation of forest-based products that use scarce raw materials will be promoted.
- People living within the Protected Area System will be assisted in their efforts to find more secure livelihood elsewhere.
- Urban forests and greenery will be promoted by applying planning standards and deterring the conversion of State owned urban land to commercial purposes

For more than a century, Thai forestry has been administrated through two partnerships. Both have come and gone. The first partnership was in the 1800s between the feudal chiefs and the concessionaires. Forest deterioration caused by uncontrolled exploitation became evident. After King Rama V established the RFD, the first partnership ended. The second partnership started-between the State and the concessionaires.

The difference between the first and the second partnerships was that laws were enacted to define how the forest was to be used, regenerated and conserved. This occurred after the RFD took control of the Kingdom's forest resources. The roles were clear. The concessionaires harvested and regenerated the forest. RFD regulated the process by defining how it was to be done and checking how it had

been done. Under the laws, the RFD had the power to impose penalties when procedures were infringed.

Nevertheless, under the second partnership, the forest continued to deteriorate. Deforestation persisted. Prompted by a series of devastating floods, public pressure mounted to stop forest destruction and reverse the trend. After continuing for almost a century, the second partnership finally ended in 1989 with the Royal Decree that banned all logging concessionaires in the uplands. Later, the RFD was instructed to concentrate on forest conservation.

The RFD suddenly found itself alone with the responsibility to protect the remaining remnant forests (25.62% of the country) from further destruction and rehabilitating State land already devoid of forests. The responsibility was enormous, but the RFD's administrative resources were inadequate. In addition, the RFD once tried to use military force to impose existing laws and resettle people from protected areas. But it merely alienated them further and, with the help of NGOs, its actions galvanised local people into a strong force of resistance. Therefore, the need for a new forestry partnership was considered.

Only one possibility for a forestry partnership remains - one with the local people left out of the two preceding partnerships during more than one hundred years of forestry development. How should RFD proceed to form a partnership with the local people? The present situation is not ideal. Rural people are naturally suspicious of the RFD after having been alienated for so long. At the same time, many of the RFD staff considers the rural people as "encroachers" and "lawbreakers"; the rural people should not be rewarded, they say, for destroying forest resources they were "responsible" for.

However, it is clear that forestry cannot proceed without involving the local people. The Thai Forestry Master Plan has therefore been based on building a State partnership with them. The Master Plan has been heavily attacked by some NGOs as a "top-down" process, but the Master Plan has actually tried to listen to what the NGOs and the local people have been saying all these years. Their message can be translated as giving them a chance to develop through forestry, and for forestry to develop through them. The Master Plan envisages the evolution of a number of different forestry partnerships. These are summarised in Box 16.

BOX 16: Different Forestry Partnerships Envisaged by the Thai Forestry Master Plan

State forestry

The State is to concentrate its forestry activities on managing the Protected Area System (Conservation Forests) in collaboration with the local people who are already conserving parts of these forests for their own benefit. The other major role of the State is to assist the other development partners.

Community forestry

Some parts of the forest are best managed as multipurpose forests by communities that are already using them, rather than as conservation forest by the State or as private forests by individual villagers (McNeely and Somchevita, 1996).

Farm forestry

Deforested State land occupied by villagers will have to be formally handed over to them through agricultural land reform, if the land can be sustainably farmed, or through forestry land reform, if the land is best kept for forestry purposes, such as on slopes prone to erosion. A leasehold forestry concept is to be introduced as a forerunner of private forestry. The lease is not to be restrictive. It will have an indefinite and secure tenure and will be transferable, hence, marketable. But provisions will be made to promote forestry land uses, such as forest plantations and cultivation of source plants of non-wood forest products (e.g., medicinal plants, bamboo, rattan, bee and fodder).

Industrial forestry

Land already used by the industrial sector for forest plantations will showcase the industrial forest as a highly productive, but sustainable land use that farm forestry can emulate with government support. The local people will benefit from the synergism between industrial and farm forestry.

Urban forestry

Forestry is not for the rural areas alone. Urban dwellers will be encouraged to develop forests and other greenery to improve their living environment and to obtain other benefits as well.

To develop the partnership, the local people will have to be informed, convinced and organised to embark on forest-based rural development. Continuous support will have to be provided. Land rights must be created and secured. Technical and material assistance such as quality planting stocks and other inputs must be provided. Secure markets for forest-based products must be created. Most importantly funds for tree planting and conservation must be found. Furthermore, zoning must be used to reduce the use for forestry of slopes prone to erosion. In addition, a lease or taxation structure must be instituted that will be nominal for forestry and agro-forestry, but punitive for speculation and other land uses.

7.0 Conclusion

About one hundred years ago, eighty percent of Thailand was endowed with forests. Today forests only cover twenty-five percent of the country. Rapid changes in social and economic development have resulted in the mismanagement of our natural forest resources and biodiversity.

Forests nurture the life of all people. Their valuable functions cannot be measured in terms of money, and money, important as it is in modern life, cannot ultimately provide the people with happiness and well being. Humans do not own nature. The Earth's forests preceded us. We are only nature's inhabitants. It is our duty to be grateful to nature. We must look after it, to ensure our survival and the survival of our generations yet to come. Presently, there is an especially encouraging sign that Thailand's local communities will participate in protecting the Protected Area System and will plant community forests. In the future, conservation, reforestation and fair and equitable uses of biological resources must be emphasised.

References

- Anonymous. 1993. *Thai Forestry Sector Master Plan, Main Report*, vol. 4. Royal Forest Department, Ministry of Agriculture and Co-operatives, Bangkok.
- Boyle T.J.B. and Boontawee B. 1995. *Measuring and Monitoring Biodiversity in Tropical and Temperate Forests*. Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Chalermpongse A. 1995. *Biodiversity of Fungi in Forest Ecosystems of Thailand*. Proceedings paper. Office of Environmental Policy and Planning (OEPP), Ministry of Science, Technology and Environment, Bangkok. on 22 January 1995, Siam City Hotel, Bangkok, Thailand.
- Charupatt T. 1993. *Analysis of Forest Situation in Thailand and the World*. Office of Surveying and Mapping, Royal Forest Department, Bangkok, Thailand.
- Collins N.M., Sayer J.A. and Whitmore T.C. 1991. *The Conservation Atlas of Tropical Forests: Asia and the Pacific*. Macmillan Press Ltd., London and Basingstoke.
- Hawksworth D.L. and Mound L.A. 1991. *Biodiversity Databases: The Crucial Significance of Collection*, in, Hawksworth D.L.(ed.). 1995. *The Biodiversity of Micro-Organisms and Invertebrates: Its Role in Sustainable Agriculture*. CAB International.
- Grimes B.F. 1974. *Ethnologue*. Wycliffe Bible Translators, Inc., Huntington Beach, California.
- Groombridge B. 1992. *Global Biodiversity: Status of the Earth's Living Resources*. Chapman & Hall, London, N.Y., Tokyo and Madras.
- Luanggiame J., Dumrongthai P. and Urasayanan J. 1997. *State of the Art Review on Managing ASEAN Forests for Biological Diversity*. Office of Environmental Policy and Planning, Bangkok.
- McNeely J.A. and Somchevita S. 1996. *Biodiversity in Asia: Challenges and Opportunities for the Scientific Community*. Office of Environmental Policy and Planning, Ministry of Science, Technology and Environment, Bangkok, Thailand.
- Royal Forest Department (RFD). 1996. *Forestry Statistics of Thailand*. Data Centre, Information Office, Royal Forest Department, Bangkok, Thailand.

Smitinand T. 1995. *Overview of the Status of Biodiversity in Tropical and Temperate Forests*, in, Boyle T.J.B. and Boontawee B. (eds.). 1995. *Measuring and Monitoring Biodiversity in Tropical and Temperate Forests*. Centre for International Forestry Research (CIFOR), Bogor, Indonesia.

Vitiyabuncha, C. 1992. *Rainfall Analysis and Distribution of Forest Types in Thailand*. MSc Thesis, Kasetsart university, Bangkok, Thailand.

Wilson E. O. 1988. *Biodiversity*. National Academy Press, Washington, D.C.