

# Forest genetic resources conservation and management in Thailand

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### **Introduction**

Forest genetic resources conservation and management in Thailand was started with Thai - Danish cooperation in tree improvement programmes, teak in 1965 and followed by pine and fast growing species in 1965 (Sumantakul 2001). The programmes have made good progress in improvement, conservation and utilization activities since its initiation. Large teak plantations have been developed as seed production areas. Provenance, clonal test plots as well as seed orchards which were established by the teak improvement programme provided a broad base for future genetic replenishment.

Indigenous and selected Central American tropical pine species *ex situ* conservation plots were initiated in 1973. Approximately 800 ha of provenance *cum* seed stands have been established in the highlands of northwest region of the country. It also included provenance stands for *Eucalyptus camaldulensis*. *In situ* conservation of lowland *Pinus merkusii* was started in 1997. *Ex situ* conservation activities of eight hardwood species were begun in 1987 (FORGENMAP 2002).

The institution which directly responsible for conservation and management of FGR is the National Park, Wildlife and Plant Conservation Department (DNP) of the Ministry of Natural Resources and Environment (MONRE). The activities at present are directed by the Ninth National Economic and Social Development Plan (2002 - 2006) which emphasizes in management practices to restore the equilibrium in the utilization and conservation of natural resources and the environment. It will promote the sustainable use of natural resources in order to support national economic development, enhance self-reliance, upgrade the quality of life of the Thai people and enhance the resilience of communities and the country (NESDB 2002).

### ***National capacity in FGR conservation & Management***

#### **Organizations**

The lead organization which is responsible for FGR conservation and management activities in Thailand is the National Park, Wildlife and Plant Conservation Department (DNP). The activities are carried out by the Silviculture Research Division, Silviculture Research and Botany Office, National Park, Wildlife and Plant Conservation Department. Its tasks are establishment of conservation plots both *in situ* and *ex situ*. At the same time promulgation of national parks, forest parks, wildlife conservation areas, non-hunting areas,

botanical gardens and arboreta. This second category is used as FGR conservation area.

Forest tree improvement is other task of the Department. Utilization and management of FGR are made accordingly. Number of staff is approximately 30 persons.

The other organization that deals with FGR conservation and utilization is the Thai Plywood Company Ltd (TPC). Its Reforestation Division carries out tree improvement, such as provenance trials, progeny trials, seed orchard establishment and species trials of indigenous and exotic tree species.

The last organization which works on utilization of FGR is the Forest Industry Organization (FIO). The major activity is also concerning with tree improvement of commercially important forest trees, teak and eucalypts.

Research / laboratory facilities of DNP, TPC and FIO

- Field testing area/facilities (DNP, TPC & FIO)
- Greenhouse (DNP)
- Molecular markers laboratory (DNP)
- *In situ* conservation areas (DNP)
- *Ex situ* conservation areas (DNP & TPC)

### **Capacity building needs and methods**

The need to strengthen human resources for government organizations in forest tree improvement, genetic and biodiversity conservation and management is crucial in Thailand. Though rather large number of personnel is working in the field of forest tree improvement and FGR conservation, but only limited numbers have been directly trained on the subjects. Therefore further training in terms of "on-the-job-training", special training courses as well as study tours in the region would benefit FGR conservation and management personnel. In country workshops are also important to build up the capacity of tackling FGR conservation and management.

### **Public awareness**

Extensive efforts have put in to raise public awareness on the issues and importance of FGR conservation and management during the past decades. TV spots as well as radio articles have been aired on reforestation campaigns, for examples; the Reforestation Campaign in Commemoration of the Royal Golden Jubilee (1994-2007), tree planting campaigns for public as well as private sectors. In the private sector, planting is done by companies engaged in the establishment of tree plantations for industrial purposes, and by the community associations and individual farmers establishing woodlots and integrated land-use systems. City greening efforts have also been emphasized in the campaign. Therefore, present and future planting programmes will use a more diverse range of species, including many indigenous and exotic species depending on purposes of planting.

### ***Institutional and political setting for FGR conservation and management***

#### **National Policies**

Conservation and rehabilitation of natural resources had been incorporated into a development plan to protect both urban and rural environment of the country

since the 8<sup>th</sup> National Economic and Social Development Plan (1997-2001). Local people and community organizations had been urged to play a more active role in management of natural resources. At the same time the country should play active role in natural resources management at regional and international levels (Emphandhu 2001).

Thailand adopted a national forest policy on 3 December 1985 (Appendix 1). The policy contains 20 key statements, some of which are important to forest management and conservation as appear below:

1. Thailand intends to have at least 40% of its land area covered by forests. Of this percentage, 25% shall be designated as economic forest and 15% as conservation forest (subsequently changed to 15% economic forest and 25% conservation forest). Economic forests are used primarily to produce timber and other non-wood forest products. Conservation forests are used to protect habitats and biological diversity.
2. All stakeholders, including local people and ethnic minorities, are responsible collectively for protecting, managing and using forest land.
3. Land-use zoning suitable for the country as a whole, must be undertaken carefully to conserve forest resources.
4. Provide education on conservation and increase environmental awareness.

The above policy statements provide a framework for conservation actions. The Royal Forest Department (RFD) has drawn up a national forest land-use plan covering the economic forest zone and the conservation forest zone.

### **National FGR task force**

No special National FGR Task Force has been set up in Thailand. However, during the past two years activities on FGR conservation management and utilization have been under the responsibility of the Division of Silviculture Research of DNP. The Royal Forest Department (RFD) and the DNP are now undergoing restructuring, which may result in some changes in the responsibility of each of these departments.

### ***FGR conservation strategies and practices***

#### **National strategies for FGR conservation and management**

The following major strategies have been set for natural resources and environmental management:

- a. Rehabilitation of natural resources and environments - degraded and abandoned lands shall be rehabilitated and managed to increase agricultural output and to minimize negative environmental impacts.
- b. Promotion of the participation of local people and communities in natural resource and environmental management - role of public sectors shall be expanded in promoting participation in natural resource and environmental management. Information network on natural resource and environmental conservation shall be developed.

- c. Improving natural resource and environment management - systematic management of water, land as well as forest resources shall be established.

The on-going activities in the context of FGR conservation and management are listed below:

1. Forest tree improvement programmes (teak, pines and fast growing species). This includes establishment of *in situ* and *ex situ* gene conservation plots, seed orchards and seed production areas.
2. Establishment of arboreta and botanical gardens.
3. Establishment of national parks, forest parks, wildlife conservation areas and non-hunting areas.

### **Priority species update**

The DNP is at present responsible for assessing conservation needs and priorities for forest species and selecting national "priority species" for FGR conservation.

The original priority species list is still used. No change has been made. List of species appears in Appendix 2.

### **National conservation strategies**

Conservation strategies for forest genetic resources of Thailand were made in 2002. Details appeared in Consultancy Report 20 of Forest Genetic Resources Conservation and Management Programme (FORGENMAP 2002).

Recommendation was to establish more *ex situ* conservation plots for top priority and very high priority species:

#### **Top priority**

1. *Azadirachta xylocarpa*
2. *Dipterocarpus alatus*
3. *Hopea odorata*
4. *Pterocarpus macrocarpus*
5. *Tectona grandis*

#### **Very high priority**

1. *Alstonia scholaris*
2. *Aquilaria crassna*
3. *Dalbergia cochinchinensis*
4. *Dalbergia oliveri*
5. *Intsia palembanica*
6. *Mangifera* spp. (wild species)
7. *Millettia kangensis*
8. *Pinus merkusii*
9. *Wrightia tomentosa*
10. *Xylia xylocarpa* var. *kerrii*

The DNP is responsible in developing and implementing the strategies. However, amount of work is depending on budget to be allocated by the Bureau of the Budget.

Consultants were hired to develop conservation and implementation strategies by FORGENMAP in 2002. At that time genetic tools (molecular markers, etc.) were not available.

### **National budget for FGR activities**

Normally there is no separate budget allocated for FGR conservation and management as well as research in Thailand. It is allocated under the Forestry Research heading. Under this heading it is also subdivided into subheadings of research, and lastly titles of research. Request for budget shall have to be made approximately two years in advance. The process is quite complicated. The request shall be scrutinized by many levels of the budget scrutiny committees. It is not possible to give figures on the budget, because it depends very much on policy of the government and economic situation of the country.

### **Challenges in FGR conservation and management**

A number of problems are hindering advancement in FGR C&M in Thailand.

They are:

1. Insufficient genetic resources of some priority species due to reduction of forest resources in the country.
2. Insufficient trained manpower.
3. Inadequate budget to carry out the programmes.

To overcome the above-mentioned problems it is vital to address by the following measures.

- a. Establish cooperation network in the region to exchange genetic resource of common species.
- b. Conduct regional training courses in FGR C&M to train officials working in this field.
- c. Seek supports from both within and outside the country to secure sufficient budget to carry out the work.

### **FGR management at the community level**

The Royal Thai Government has announced the policy on city greening throughout the country lately. The policy is to encourage every district, sub-district and village to plant trees in their community in the form of parks, botanical gardens, or arboreta, etc. Appropriate FGR shall be utilized for the purposes.

### ***Updates since last workshop***

No major update has been made in Thailand since the July 2003 APFORGEN Inception Workshop. This is due to departmental restructuring of RFD and DNP under the Ministerial Regulations B.E.2547 (2004). However routine work on FGR C&M has been carried on.

### ***Regional collaboration on FGR C&M***

As mentioned earlier, advancement in FGR C&M in Thailand has been hindered by the lack of sufficient genetic resources, trained manpower and budget. Therefore regional collaboration is needed to make progress possible. Countries

in the region which experienced these common problems should link up to share experiences, information, and exchange germplasm and scientists.

Training courses and on-the-job training on FGR C&M can also be arranged using regional and international experts. Workshops as well as study tours are also effective means for fast learning. This shall help make FGR C&M into one standard. Content of the courses may be emphasized on priority species selection criteria, tree selection criteria, methods of propagation, conservation strategies, the use of genetic tools, maintenance and management methods, etc.

APFORGEN should work along the above-mentioned lines in order to make the project sustainable. At the same time financial supports from international organizations should be sought by APFORGEN to help run programmes in the region.

### ***References***

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## **Appendix 1. Thailand National Forest Policy**

The Cabinet approved the National Forest Policy on 3<sup>rd</sup> December 1985. The details are as below:

To achieve a long term and coordinated national forest administration and development and for better understanding between state and private sectors, it is hereby declared as a National Forestry Policy that :

1. Long term guidelines for forest management and development shall be established to maximize national social and economic benefits and national security, with sufficient measures provided for environment protection. Emphasis shall be placed on harmonized utilization of forest resources and other natural resources.
2. Role and responsibility sharing among various government agencies and the private Sector in forest management and development shall be promoted.
3. National forest administration shall be reorganized in line with the changing quality and quantity of forest resources and environment.
4. Forty percent of the country area shall be kept under forests. The forest area shall be divided as follows:
  - 4.1 Protected forest: 15 percent of the country area shall be kept as protection forests for nature conservation, recreation and environmental quality protection.
  - 4.2 Production forest: 25 percent of the country area shall be designated as production forest to produce timber and other forest products.
5. Public and private sectors together shall develop and manage the forest area to achieve the objective of providing perpetual direct and indirect benefits to the country.
6. Science and technology to increase the efficiency of agricultural production shall be enhanced to reduce the risk of the forest being destroyed to increase agricultural land.
7. The State shall establish a forest development plan as part of the natural resources development plan in the National Economic and Social Development plan to harmonize a mutual utilization action between forest resources and other natural resources.
8. Efficiency in timber production shall be increased through appropriate forest management techniques using both selection and clear cutting systems. In the clear cutting system, the cleared area shall be replanted immediately.
9. To conserve and protect natural environment, the State shall accelerate the city planning process and designate specific area for forest residential, rural and agricultural areas in each province to prevent forest land encroachment.
10. National Forest Policy Committee shall be established under the Forest Acts for policy formulation, supervision and management of national forest resources.
11. The State shall undertake extension programs to create public awareness, instill positive attitude, and proper skills on the wise-use, as opposite to the negative effects of forest destruction and wasteful use of forest resources.
12. The State shall promote reforestation by the public and private sectors for domestic industrial consumption. Export of wood and wood products shall be encouraged.

Community forestry such as reforestation on public land by private sector, tree planting on marginal agricultural land and establishment of forest woodlot for household consumption shall also be promoted.

13. The State shall encourage integrated wood using and pulp and paper industries to realize the whole-tree utilization concept.
14. Amendment of Forest Acts shall be made to support efficient forest resources conservation and utilization.
15. Forest research shall be carried out in collaboration with universities and educational institutions concerned.
16. Wood energy as a substitute of fossil energy shall be promoted through energy plantations.
17. Any land with the slope of 35 percent or more on an average shall be designated as forest land. No title deed, or land use certificate under the Land Acts shall be issued for the land of this category.
18. Explicit guidelines shall be established to deal with various forest degradation problems e.g. shifting agriculture, forest fires, forest clearing by the hill tribe minorities, etc. Measures on enforcement of law penalty codes shall be specified and respective due processes shall be established. Measures shall also be devised to penalize corrupted government official and influential person.
19. Incentive systems shall be established to promote reforestation by the private sector.
20. Human resource and rural settlement planning must be in conformity with national natural resources management and conservation plans.

NB: The targets in item 4 have later been changed to 15 percent economic forest and 25 percent conservation forest.

## Appendix 2

### Information on the priority species for Thailand

Priority level and species	Areas managed for Conservation (ha)			Areas managed in natural forest for production (ha)		Areas managed in plantation for production (ha)		Recommend Actions for genetic conservation	References and reports
	<i>In situ</i>	<i>Ex situ</i>	Seed production	Timber	Non-timber	Timber	Non-timber		
<b>TOP PRIORITY</b> <i>Azelia xylocarpa</i> <i>Dipterocarpus alatus</i> <i>Hopea odorata</i> <i>Pterocarpus macrocarpus</i> <i>Tectona grandis</i>		40 72 52 36 1894	1221					Establish more <i>ex situ</i> conservation efforts Establ. more <i>ex situ</i> Establ. more <i>ex situ</i> Establ. more <i>ex situ</i> Strict protection	FORGENMAP 2002 FORGENMAP 2002 FORGENMAP 2002 FORGENMAP 2002 Unpublished report of TIP (2001)
<b>VERY HIGH PRIORITY</b> <i>Alstonia scholaris</i> <i>Aquilaria crassna</i> <i>Dalbergia cochinchinensis</i> <i>Dalbergia oliveri</i> <i>Intsia palembanica</i> <i>Mangifera</i> spp. (wild species) <i>Millettia kangensis</i> <i>Pinus merkusii</i>  <i>Wrightia tomentosa</i> <i>Xylia xylocarpa</i> var. <i>kerrii</i>	1060	56 34 13 50	5.7					Establ. <i>ex situ</i> Establ. <i>ex situ</i> Establ. more <i>ex situ</i> Establ. more <i>ex situ</i> Establ. <i>ex situ</i> Establ. <i>ex situ</i> Establ. <i>ex situ</i> Establ. more <i>ex situ</i> Establ. <i>ex situ</i> Establ. more <i>ex situ</i>	FORGENMAP 2002 FORGENMAP 2002 Unpublished report of PIP 2001 FORGENMAP 2002

Priority level and species	Areas managed for Conservation (ha)			Areas managed in natural forest for production (ha)		Areas managed in plantation for production (ha)		Recommend actions for genetic conservation	References and reports
	<i>In situ</i>	<i>Ex situ</i>	Seed production	Timber	Non-timber	Timber	Non-timber		
<b>OTHER PRIORITY</b> <i>Azadirachta excelsa</i> <i>Chukrasia</i> spp. <i>Cotylelobium melanoxyton</i> <i>Dipterocarpus tuberculatus</i> <i>Durio mansonii</i> <i>Fagraea fragrans</i> <i>Gmelina arborea</i> <i>Holoptelea integrifolia</i> <i>Hopea ferrea</i> <i>Manglietia garrettii</i> <i>Mansonia gagei</i> <i>Azadirachta indica</i> <i>Melientha suavis</i> <i>Parashorea stellata</i> <i>Pakia speciosa</i> <i>Pinus kesiya</i>		233	42.8					Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish <i>ex situ</i> Establish more <i>ex situ</i>	Unpublished report of PIP 2001
<i>Shorea henryana</i> <i>Shorea roxburghii</i>  <i>Tetrameles nudiflora</i> <i>Toona ciliata</i>		36						Establish. <i>ex situ</i> Establish. more <i>ex situ</i>  Establish. <i>ex situ</i> Establish. <i>ex situ</i>	FORGENMAP 2002