

C. THAILAND

COUNTRY SUMMARY

In Thailand 8 institutions were visited, three are government agencies, three university departments or faculties, one a bi-laterally funded project and one an ICRAF research project. All are involved with tree domestication activities, particularly: species collection and testing; propagation and germplasm issues; training; and information production and distribution. ICRAF and the Highland Economic and Social Development Promotion Office (HESD) focus on smallholder systems for upland communities. The Multiple Cropping Centre, the Faculty of Forestry in Kasetsart University and the Soil Science Department at Khon Kaen University also focus on smallholder systems but are not limited to the uplands. Through its agroforestry activities, the Silvicultural Research Division is involved with smallholder tree farming systems. Forest Genetic Resources Conservation and Management Project (FORGENMAP) and the Forest Nursery Division have the mandate and ability to supply germplasm of a broad array of species. The Faculty of Forestry and the Forest Nursery Division have strong training and information distribution activities. None of the organizations have a major focus on tree domestication, but they are involved in incorporating valuable tree species into smallholder systems in both the uplands and lowlands. Generally the focus is on timber, fruit or species with high-value products. There is a strong emphasis on indigenous species, *Acacia*, *Eucalyptus* and *Tectona grandis*. Most of the organizations feel there is good opportunity for a 'smallholder tree domestication' effort to make positive contribution to on-going work across Thailand. Focal species specified by institutions are summarized on an institutional and Thailand basis in Annex III and V. Institutional tree domestication capacity and the primary institutional strengths for Thailand are summarized in Annex VIII and X.

LIST OF ORGANISATIONS VISITED

1. Faculty of Forestry, Kasetsart University
2. Forest Genetic Resources Conservation and Management Project (FORGENMAP)
3. Forest Nursery Division
4. Highland Economic and Social Development Promotion Office (HESD)
5. ICRAF Mae Chaem Watershed Research Site
6. Multiple Cropping Center, University of Chiang Mai
7. Silviculture Research Division
8. Soil Science Department, Khon Kaen University

PROFILES ON ORGANISATIONS

1. Faculty of Forestry, Kasetsart University

Kasetsart University, founded in 1943, has nine faculties, one of which is Forestry. The Forestry Faculty has an academic staff of 53 and offers degree programs at undergraduate and graduate levels. It undertakes research, extension and information development/transfer activities with rural communities. Regular workshops and training programs are conducted for government officials and farmers. The research priorities are: species exploration, collection and evaluation; tree improvement; vegetative propagation; germplasm multiplication, conservation and distribution; silviculture; and wood processing and utilization. The Faculty's experience indicates that the species types for smallholder domestication are fast growing timbers, fruit trees and medicinal plants. All of these species types have a firm commercial value. One species worth specific note is *Garcinia cambogia*; it has high potential for domestication due to its medicinal properties and culinary uses. Many farmers use indigenous timber species, which have not yet been adequately studied. Some smallholders utilize *Acacia* and *Eucalyptus* species for farm-level wood production, but other exotics - specifically hybrids - are still not familiar to smallholders.

Faculty of Forestry

Office of the President

Kasetsart University

Bangkok

Tel: (66-2) 9428191

Fax: (66-2) 9422408127

E-mail: fforsrb@nontri.ku.ac.th

Contact Person: Prof. Suree Bhumibhamon (Vice President for International Affairs)

2. Forest Genetic Resources Conservation and Management Project (FORGENMAP)

FORGENMAP is a bilateral project between the Ministry of Agriculture and Cooperatives (MOAC) and Danish Cooperation for Environment and Development (DANCED) operated through the Research Office of the Royal Forest Department. The project started in 1997 with an initial phase of 3 years. It is mandated to: i) maintain and protect biodiversity; ii) conserve and sustainably manage forest genetic resources; iii) establish regular supply of good quality forest seed; and iv) create awareness of the need and benefits of using good quality seed. The activities are coordinated through four regional seed centers. Seed sources used by the project are identified by the Forest Department and by people or organizations familiar with high quality mother trees or stands. Once collected, seed stocks are stored at the four seed centers, from where they are distributed to private industry and farmers. The project also collaborates with private companies, some of which have their own tree improvement programs. Some of these firms even export seeds. Most of the species targeted in FORGENMAP activities are indigenous, but there is also a strong emphasis on fast growing exotics for industrial use, mainly *Acacia* hybrids, *Eucalyptus grandis*, *Eucalyptus camaldulensis* and *Eucalyptus urophylla*. The project has conducted a series of national workshops to identify priority species for different key purposes - industrial use, local non-wood use, soil and water conservation, biodiversity protection - for the major ecozones of the country. Total annual seed demand has been forecast for a four-year period. This data is useful to formulate a long-term seed production and management program.

Forest Genetic Resources Conservation and Management Project (FORGENMAP)
Silviculture Research Center 1
Huay Kaew Road
Chiang Mai 50200
Tel/Fax: (66-53) 222472
E-mail: anders@cm.ksc.co.th
Contact Person : Dr Anders P. Pedersen (Technical Advisor)

3. Forest Nursery Division

The Nursery Division is under the Forestry Research Office of the Royal Forest Department. It has a staff of 80 and well-equipped laboratories and training facilities. The division's main function is to: i) increase the supply and production of quality seedlings to meet the demands from the government and local communities; ii) establish model community forests; and iii) accelerate reforestation programs by training government officers, local leaders and village groups. The division is involved in species exploration and collection; species and progeny evaluation and testing; germplasm collection, multiplication and distribution; and training and information dissemination. It works closely with other institutions, including FORGENMAP. There are 13 central nurseries, 4 of which were formerly supported by JICA. Each nursery has the capacity to produce five million seedlings per year.

Forest Nursery Division
Royal Forest Department
Ministry of Agriculture and Cooperatives
Chatuchak, Bangkok 10900
Tel /Fax: (66-2) 5795569
Contact Person : Mr. Pricha Aramphongphun (Director)

4. Highland Economic and Social Development Promotion Office (HESD)

Since 1994 HESD is engaged in supporting tribal development in 14 provinces of North Thailand. It has a staff of 600 working in 14 provincial centers. It follows an integrated approach to manage watersheds with people's participation, towards a goal of forest conservation and reclamation of degraded areas. A main focus is reforestation with horticultural crops to replace opium cultivation. Focal species include: *Coffea arabica* (coffee), *Camellia sinensis* (tea), *Litchi chinensis* (lychee), *Mangifera indica* (mango) and vegetables. Other tree crops are not main components of the present models, but are recognized as important. Tree crops such as *Tectona grandis* (teak), bamboos, rattans, *Artocarpus heterophyllus* (jackfruit), *Arenga pinnata* (sugar palm), *Xanthoxylum lemonella* are considered to have high potential. A major hindrance to utilizing these and other candidate trees is a paucity of germplasm and technical information for the area (uplands) and audience (farmers and extension workers).

Highland Economic and Social Development Promotion Office (HESD)
Hill Tribe Welfare Division, Dept of Public Welfare
Ministry of Labour and Social Welfare
Chiang Mai 50300
Tel: (66-53) 222830-1
Fax: (66-53) 210391
Contact Persons: Mr. Songsak Tepsarn (Chief, Economic Development Section); Mr. Leeseuk Rithnatikul; Mr. A. Thananon

5. ICRAF Mae Chaem Watershed Research Site

ICRAF's activities in Thailand, funded by the Ford Foundation, are concerned with identifying socially and environmentally appropriate watershed management methods under the de facto patchwork of government-private ownership and objectives that are common in most upland areas. Activities are focused on Mae Chaem watershed in Northern Thailand with particular emphasis on plant biodiversity and indigenous knowledge. ICRAF's community watershed mosaic approach attempts to reduce shifting agriculture and upland rice cultivation by expanding forest resources through the cultivation of valuable forest trees or horticultural crops such *Mangifera indica* (mango), *Dimocarpus longan* (longan) and *Durio zibethinus* (durian). ICRAF could assist national tree domestication efforts by strengthening or developing linkages with organizations or networks already concerned with smallholder domestication activities. The Kings Project that operates under the Royal Project Foundation, a re-known field-oriented program, could serve as a contact point for a national smallholder tree domestication initiative. In the Thai-context, the ICRAF program feels domestication should focus on the crucial areas of: forest and horticultural species selection and testing; diversification of the current systems; germplasm production and distribution; post-harvest processing and storage technologies; and product marketing. There is a great potential for incorporation of high value trees, specifically forest or horticultural species, into smallholder upland systems in North Thailand. To date no project or organization has used the 'smallholder tree domestication' approach to pursue this potential.

ICRAF Mae Chaem Watershed Research Site
Forest Resources Department, Faculty of Agriculture
Chiang Mai University
PO Box 267, CMU Post Office, Chiang Mai 50202
Tel.: (66 53) 357906, 357907
Fax: (66-53) 357 908
E-mail: david@cmu.chiangmai.ac.th; D.Thomas@cgiar.org
Contact Person : Dr. David Thomas (Senior Policy Analyst)

6. Multiple Cropping Center, University of Chiang Mai

The Multiple Cropping Center, University of Chiang Mai has a staff of 3 senior scientists and a 6-ha experimental station where species trials and other research activities are conducted. It is engaged in research on the development of cropping systems for both lowlands and highlands in North Thailand. Lowland cropping systems are mainly based on rice and legumes, while the rainfed upland systems are more diverse, dealing with a wide range of horticultural crops. In these upland systems, both short- and medium-rotation crops are used to provide sustainable incomes to the farmers. The primary short-rotation species include *Musa* sp. (banana), *Annona* species and *Psidium guajava* (guava); the medium-rotation species include *Azadirachta indica* (neem), *Mangifera indica* (mango) and *Dimocarpus longan* (longan). Related to tree domestication activities, the Center has experience in: species exploration, selection and testing; plant propagation; germplasm collection, storage and distribution; and some training and information services. These activities are restricted to horticultural crops. In the upland systems timber species are prominent and have potential for further domestication. *Tectona grandis* (teak) has highest potential as it could be harvested in 6-7 years for finger jointing, picture framing and decorating walls of houses. *Citrus* species remain unexploited in the north. The Center identifies *Citrus grandis* (pummillo) as an outstanding choice for export to metropolitan areas. There are many indigenous species with high potential that remain unexplored. Two of these are noteworthy. *Xanthoxylum lemonella* produces an edible fruit, which is sold fresh or dried; the seed coat from which is a spice for tenderizing meat. *Castanopsis* (Chestnut), of which there are 6 species, produce large edible nuts that are favored by rural populations and find a ready local market.

Multiple Cropping Center, Faculty of Agriculture
University of Chiang Mai
Chiang Mai 50200
Tel: (66-53) 221275
Fax: (66-53) 210000
E-mail: phrek@mcc.aggie.cmu.ac.th
Contact Person: Mr. Phrek Gypmantasiri (Asso. Director & Chairman, Agric. Systems)

7. Silviculture Research Division

Silvicultural Research Division is under the Forest Research Office of the Royal Forest Department. It has a technical staff of 120 and is the central organization for silvicultural research in Thailand. Its research activities include: species exploration and collection; tree improvement; propagation and nursery techniques; plantation establishment and management; silvicultural; and agroforestry. Its agroforestry research activities cater to the needs of private reforestation and community forestry development. These activities are where the research division is involved with tree domestication work relevant to smallholders. To assure suitability, the division's agroforestry models are developed with the participation of farmers. This process has identified several priority tree species for farmer agroforestry models. Priority species with a rotation cycle of 5-10 years include: *Eucalyptus camaldulensis*, *Acacia mangium*, *Acacia auriculiformis*, *Senna siamea*, *Casuarina equisetifolia*, *Casuarina junghuhniana* and bamboos. Those with a rotation of 10-20 years are: *Azadirachta indica*, *Azadirachta excelsa*, *Albizia lebbek*, *Albizia procera*, *Albizia saman*, *Melia azedarach*, *Alstonia scholaris*, and *Parkia* sp. Long rotation species, 20-30 year cycles, are: *Tectona grandis*, *Pinus kesiya*, *Dipterocarpus alatus*, *Pterocarpus macrocarpus* and *Chukrasia velutina*.

Silviculture Research Division, Forest Research Office
Royal Forest Department
Chatuchak, Bangkok 10900
Tel: (66-2) 5614292-3 ext 408,409
Fax: (66-2) 5799576/5614809
Contact Person : Dr. Pitaya Petmak (Head)

8. Soil Science Department, Khon Kaen University

The Soil Science Department has 18 academic staff and 1200 students. Its activities are mainly teaching and research. Its major research focus is on soil fertility improvement through the use of the litter of *Shorea* sp., *Azadirachta indica* (neem), *Sesbania* sp., *Leucaena* sp. and *Albizia saman*. Farmers indicate to Department staff that they prefer wood and fruit species for on-farm cultivation. Preferred species included: *Acacia* sp., *Eucalyptus* sp., *Tectona grandis* (teak), *Artocarpus heterophyllus* (jackfruit), *Azadirachta indica* (neem), *Pterocarpus macrocarpus*, *Mangifera indica* (mango), *Dimocarpus longan* (longan), *Litchi chinensis* (lychee) and *Tamarindus indica* (both sweet and sour). The main obstacles to smallholder tree domestication are: a lack of quality planting material; a lack of practical knowledge on multiplication techniques, specifically vegetative methods; limited experience and information concerning tree management under smallholder conditions; and limited information on marketing smallholder tree products.

Soil Science Department, Faculty of Agriculture
Khon Kaen University
Khon Kaen 40002
Tel: (66-43) 237602
Fax: (66-43) 244474/243097
E-mail: patma@kkul.kku.ac.th
Contact Person : Dr. Patma Vityakon (Assoc. Dean for Research)

D. VIETNAM

COUNTRY SUMMARY

Of the 12 organizations visited in Vietnam, nine are government agencies and three are university faculties or departments. All except one are closely involved with tree domestication activities. Vietnamese Agricultural Science Institute (VASI), College of Agriculture and Forestry (CAF) and Xuan Mai Forestry University are engaged in a broad range of domestication activities that target the needs of smallholders. Although tree domestication is not their main activity, these institutions would be versatile key partners for smallholder domestication activities. The Forest Inventory and Planning Institute (FIPI), Forest Science Sub Institute of South Vietnam (FSSIV), Institute of Agricultural Science of South Vietnam (IAS) and Research Centre for Forest Ecology and Environment (RCFEE) also are strongly involved with activities that encompass part of the domestication continuum and work with smallholders. However, their mandates focus institutional energies on topics other than tree domestication. They would be good secondary partners for information sharing or direct collaboration when common agenda existed. The Research Centre for Forest Tree Improvement (RCFTI), Central Forest Seed Company (CFSC), Forest Research Centre (FRC) and Forest Seed and Planting Materials Enterprise are primarily involved in the collection, production, use and distribution of improved tree germplasm. (There are seven other regional forest seed enterprises across the country). These four germplasm-focused organizations each considers smallholders important secondary clients. Of all those visited, several institutions have a strong emphasis towards industrial species, primarily *Acacias*, *Eucalyptus*, *Pinus* and hybrids. The others have a broader focus that includes industrial, non-industrial, indigenous and multipurpose species. The Department of Botany and Ecology works on the conservation of rare forest plants. It would be a useful partner if such species were identified as suitable components of smallholder domestication systems. Focal species specified by institutions are summarized on an institutional and Vietnam basis in Annex IV and V. Institutional tree domestication capacity and the primary institutional strengths for Vietnam are summarized in Annex IX and X.

Reviewer's note: Besides those species mentioned by the 12 institutions visited during the study there are a number of other species that are managed by smallholder farmers for timber and non-timber products which deserve mention. Foremost among this group are: *Aquilaria agallocha*, *Corypha lecomtei*, *Cycas circinalis*, *Cycas rumphii*, *Gleditsia ferrea*, *Livistona* sp., *Nypa fruticans*, *Oroxylum indicum*, *Sapindus mukorossi*, *Sapium sebiferum*, *Spondias mangifera*, *Sterculia lychnophora*, *Strychnos nux-vomica*, *Taxus baccata*, *Thea sesanqua* and *Wrightia tomentosa*. Many of these species are lesser-known indigenous species yielding products used in the home and marketed locally. Some of the products are marketed nationally or internationally. Incorporating these species into smallholder activities would have the following advantages: enhancing economic options for smallholders; enriching the species component of smallholder agroforestry systems; and serving as ex-situ conservation of biodiversity. As with other species mentioned in the previous section, appropriate propagation and management systems for many of these species are yet to be identified or compiled

LIST OF ORGANIZATIONS VISITED

1. Central Forest Seed Company (CFSC)
2. College of Agriculture and Forestry (CAF), National University of Ho Chi Minh City
3. Department of Botany and Ecology, National University of Ho Chi Minh City
4. Forest Inventory and Planning Institute (FIPI)
5. Forest Research Centre (FRC)
6. Forest Science Sub Institute of South Vietnam (FSSIV)
7. Forest Seed and Planting Materials Enterprise
8. Institute of Agricultural Science of South Vietnam (IAS)
9. Research Centre for Forest Ecology and Environment (RCFEE)
10. Research Centre for Forest Tree Improvement (RCFTI)
11. Vietnamese Agricultural Science Institute (VASI)
12. Xuan Mai Forestry University of Vietnam

PROFILES ON ORGANISATIONS

1. Central Forest Seed Company (CFSC)

The main objective of the Central Forest Seed Company (CFSC) is to produce improved forest tree seed and planting material for government organizations and farmers. There are 9 regional seed enterprises to meet the needs of different parts of the country. The CFSC is the nominal head of the regional enterprises, but each operates independently. Comments here refer to the CFSC exclusively. Seed production areas and orchards have been established by selecting plus trees of indigenous, exotic and fruit tree species. Seed from CFSC is primarily intended for: i) reforestation activities in protected areas, ii) other government planting programs and iii) farmers use. Species available from CFSC are: *Acacia auriculiformis*, *Acacia mangium*, *Aleurites montana*, *Anacardium occidentale*, *Anisoptera cochinchinensis*, *Canarium album*, *Canarium nigrum*, *Senna siamea*, *Casuarina equisetifolia*, *Cinnamomum cassia*, *Cunninghamia lanceolata*, *Dipterocarpus alatus*, *Endospermum chinense*, *Eucalyptus camaldulensis*, *Eucalyptus tereticornis*, *Euphoria longana*, *Gmelina arborea*, *Hopea odorata*, *Illicium verum*, *Khaya senegalensis*, *Leucaena leucocephala*, *Litchi chinensis*, *Mangifera indica*, *Mangifera minor*, *Manglietia glauca*, *Melaleuca cajuputi*, *Melia azedarach*, *Pinus massoniana*, *Pinus merkusii*, *Pinus kesiya*, *Styrax tonkinensis*, *Swietenia macrophylla*, *Tectona grandis*, *Tephrosia candida*, *Chukrasia tabularis*, *Dalbergia bariensis*, *Erythrophloeum fordii*, *Madhuca pasquieri*, *Markahamia stipulata*, *Azalia xylocarpa*, *Parashorea chinensis*, *Pterocarpus macrocarpus*, *Pterocarpus pedatus*, *Sindora cochinchinensis*, *Talauma gioi*, *Tarrietia javanica*, *Toona febrifuga* and *Xylia dolabriformis*. The seed of other species may also be available through CFSC from secondary sources. Seed storage facilities at CFSC are limited, so most seed is distributed shortly after collection. Clonal banks have been established with *Acacia* and *Eucalyptus* hybrids to provide quality planting materials (some of these activities in collaboration with the Research Centre for Forest Tree Improvement, RCFTI). Provenance and progeny trials of *Pinus merkusii*, *Casuarina equisetifolia* and *Tectona grandis* are also in progress. The CFSC also has the capacity to provide training in germplasm management, seed orchard and production area management, and nursery practices. Most of the CFSC's land area is used for applied research.

Central Forest Seed Company (CFSC)
Ministry of Agriculture and Rural Development
62, Cau Dien Township
Tu Liem, Hanoi
Tel: (84-48) 372469/372472
Fax: (84-48) 372470
Contact Person : Dr. Nguyen Duong Tai (Director)

2. College of Agriculture and Forestry (CAF) at Thuduc District

Formerly belonging to Thuduc Polytechnic University, the College of Agriculture and Forestry (CAF) was integrated into the National University of Ho Chi Minh City in 1993. CAF is based on the United States land-grant college system. It has the combine objectives of teaching, research and extension. The Faculty of Forestry, one of 6 faculties in CAF, has 4 departments: Silviculture; Forest Plantation and Urban Forestry; Forest Inventory and Management; and Social Forestry. The forestry research programs include forestland management, biomass studies, wood processing, and the development of sustainable agroforestry systems. Rehabilitation of degraded lands is a major priority in Vietnam and a significant focus of CAF. The college's sustainable agroforestry systems and tree domestication activities are focused on degraded lands. It is involved in activities across the domestication continuum. Species included in CAF's various domestication activities are: *Gliricidia sepium*, *Trema orientalis*, *Indigofera teysmannii*, *Eucalyptus camaldulensis*, *Eucalyptus tereticornis*, *Casuarina equisetifolia*, *Khaya senegalensis*, *Swietenia macrophylla*, *Litsea* sp., *Leucaena glauca*, *Sapindus saponaria*, *Canarium* sp., *Melia azedarach*, *Melia dubia*, *Moringa oleifera*, *Erythrina variegata*, *Erythrina poeppigiana* and *Cinnamomum* sp. Fast growing nitrogen fixing trees which produce a lot of biomass are important in reclaiming degraded sites and simultaneously providing green manure, animal and fish fodder, fuelwood, poles and shade for coffee or other crops. Several forest species and *Acacia* and *Eucalyptus* hybrids are also popular with farmers for wood production and income generation. CAF is cautious about promoting *Acacia* and *Eucalyptus* with farmers because these species are reported to have proliferated out of control in some places. The promotion of hybrids has resulted in disappointment and disillusionment with farmers because of F2 segregation. Of the species mentioned above CAF considers *Indigofera teysmannii* to have the highest potential for domestication, as it has a wide array of uses and is popular with farmers. However, no tree improvement has been attempted. *Litsea* is another species with high-potential which remains untapped. The lack of germplasm and propagation information are major problems. CAF feels that on-farm domestication research should focus on: i) indigenous knowledge; ii) propagation and management of indigenous species; and iii) rejuvenation of degraded lands.

Faculty of Forestry
College of Agriculture and Forestry at Thuduc District
National University of Ho Chi Minh City
Thu Duc Dist, Ho Chi Minh City
Tel: (84-8) 8974562/ 8966946/ 8966780
Fax: (84-8) 8960713
E-mail: nvso.vnafe@fmail.vnn.vn
Contact Persons: Dr. Bui Cach Tuyen (CAF Rector); Prof. Luu Trong Hieu (Director at the time of study); Mr. Nguyen Van So (Deputy Dean of the Faculty of Forestry)

3. Department of Botany and Ecology

The Department of Botany and Ecology is a member of the National University of Ho Chi Minh City. It has 5 scientists and 400 students. Their main research concerns are the exploration, collection and taxonomic characterization of rare plant species for conservation. Examples of priority species include: a rare five-needled indigenous pine, *Cinnamomum* species, wild orchids, understory forest shrubs and ornamental plants. Many

of these species, some not yet identified, are in danger of becoming extinct. The department feels some of these species may hold promise for smallholder domestication. While the department focuses on exploration and collection, associated departments in the University specialize on propagation, germplasm issues, silviculture, utilization, and processing and marketing. The lack of propagation techniques and information are considered the main problems in conservation of these species.

Department of Botany and Ecology
College of Natural Sciences (CNR)
National University of Ho Chi Minh City
227, Nguyen Van Cu St, 5th Dist
Tel: (84-8) 8242168
Fax: (84-8) 8653174

Contact Persons : Dr. Le Cong Kiet (Chairman of the Department); Mr. Nguyen Thien Tich (Senior Lecturer)

4. Forest Inventory and Planning Institute (FIPI)

Forest assessment, monitoring and planning is the main activity of the Forest Inventory and Planning Institute (FIPI) and its sub-institutes located in various regions of the country. Protected areas, national parks and national reserves are the direct responsibility of FIPI, but it is also responsible for monitoring all forestlands in the country, including protection forest for watershed conservation, industrial forests, community forests and private forests. Agroforestry is a peripheral but important aspect of FIPI's work, particularly with community and private forests and where smallholders make extensive use of government forest resources. FIPI wants forest use at all levels to be sustainable. FIPI has a major target to increase forest cover in the country by 50% (4.5 million hectares). This is why agroforestry and domestication are seen as important. Species considered appropriate for domestication include rattan, bamboo, mushrooms, medicinal plants, *Cinnamomum* sp., *Tectona grandis* (teak), fast growing trees species, fuelwood species, non-timber trees and species which are of interest for social or ethnic reasons. Fast growing *Acacia* and *Eucalyptus*, which are promoted for industrial and government forests, are also considered good for smallholder domestication. Actually, any species that can be used in smallholder systems and help promote tree cover would be acceptable for domestication. Problems that hinder FIPI work and smallholder domestication include: inadequate technical information and practical experience on the development and management of home gardens and forest buffer zones; inadequate germplasm production and distribution; inadequate knowledge on propagation and management of many indigenous species; weak marketing channels; and inadequate marketing information.

Forest Inventory and Planning Institute (FIPI)
Ministry of Agriculture and Rural Development
Thanh Tri, Hanoi
Tel.: (84-4) 8615511
Fax: (84-4) 8612881
E-mail: Phonpifi@fpt.vn
Contact Person : Dr. Nguyen Huy Phon (Deputy Director)

5. Forest Research Center (FRC)

Established in 1976, Forest Research Center (FRC) operated as the research and production arm of the Vietnam Paper Corporation. FRC conducts provenance and progeny trials to evaluate tree species for paper pulp production. Present emphasis is on *Pinus*, *Eucalyptus*, *Acacia* and their hybrids. A strong plant material production and nursery program has evolved. Much of the production is through cuttings of hybrids. Micro-propagation by tissue culture has also been successful. FRC operates 6.5 hectares of seed orchards of *Acacia mangium* and *Eucalyptus urophylla*. Annually, over 500,000 high-quality seedlings

are planted to expand the paper companies plantations. Upon request, seedlings are also provided to farmers. FRC has developed integrated agroforestry systems with pulp trees, fruit trees and agricultural crops to reclaim degraded lands and expand farming options for smallholders. However, the main problem is that farmers do not use improved silvicultural techniques and need training in tree plantings and stand maintenance. Additionally, suitable fruit tree species have to be selected among the many available in the region, this task is beyond the capacity of the FRC. Inadequate information on the management of combined pulp-fruit tree plantations is another constraint for further promotion of these agroforestry systems.

Forest Research Center (FRC)

Vietnam Paper Corporation

Phuninh, Phutho

Tel: (84-21) 829384/829241

Fax: (84-21) 828275

Contact Person : Mr. Mai Dinh Hong (Vice Director)

6. Forest Science Sub-Institute of South Vietnam (FSSIV)

The Forest Science Sub-Institute of South Vietnam (FSSIV) is one of the oldest and best-known forest research institutes in Vietnam. It has 40 scientists and a total of 80 technicians. FSSIV has a 1400 ha research facility including nurseries and well-equipped laboratories. The mandate of the Sub-Institute includes: seed technology; plant propagation; tree breeding; forest production, management and protection; forest product processing and utilization; wood preservation; socioeconomic issues related to forest use; policy issues related to land use and distribution; marketing of forest products; and forest taxation issues. This covers all areas of the domestication continuum. The Sub-Institute's major research focus is on exotic and indigenous species of industrial value. They manage seed orchards, natural seed production areas, and plus-tree plantations. They have extensive nurseries operations, propagating plants from seed, cutting and tissue culture. A priority program is the enrichment of natural forests with *Dipterocarpus* sp. and *Tectona grandis*. They have a structured smallholder agroforestry program in which the tree component targets industrial products. The main tree species in these systems is *Melaleuca leucadendra* for poles and oil production. Farmers keep the food products from the system. Income from the trees is split equally between farmers and Sub-Institute. Bamboo has potential in these systems for the production of construction material, chip board manufacture and food. The main problems regarding tree domestication are: a lack of skilled technicians, particularly tree breeders; lack of knowledge and experience in vegetative propagation methods; and a shortage of appropriate species or hybrids for industrial production in different ecological zones.

Forest Science Sub-Institute of South Vietnam (FSSIV)

Pham Van Hai St Tan Binh Dist.

Tel: (84-8) 8441496

Fax: (84-8) 8448696

Contact Persons: Mr. Ngo Duc Hiep (Director); Dr. Pham The Dung (Vice Director)

7. Forest Seed and Planting Materials Enterprise

Established in 1977, the Enterprise has a relationship with the Central Seed Company in Hanoi, but operates independently. Total number of staff is 84 with 17 having degrees in biological disciplines. The Enterprise is mandated to: i) establish and maintain seed stands for the support of forestry activities; ii) improve the genetic and physiological quality of the seed used in forestry activities; iii) export seed to international customers; and iv) develop vegetative propagation and tissue culture techniques for priority species. Its main activities are tree breeding; propagation; germplasm collection, conservation, multiplication and distribution; and silvicultural techniques for seed production areas. Its

primary objective is tree improvement through selection, breeding, and management. Target clients are, first, state enterprises, and second, smallholder farmers. To reach farmers the Enterprise has developed special advertising programs on television, a newsletter and a program to meet with farmers' groups. This is effective but very time-consuming. The Enterprise is looking for a more efficient extension linkages. Major species for which seed is available through the Enterprise are: *Acacia mangium*, *Acacia auriculiformis*, *Acacia* hybrids, *Eucalyptus camaldulensis*, *Cassia fistula*, *Senna siamea*, *Casuarina equisetifolia*, *Tectona grandis*, *Melaleuca* sp., *Hopea odorata*, *Dipterocarpus alatus*, *Azelia xylocarpa*, *Peltophorum ferrugineum*, *Peltophorum* sp., *Khaya senegalensis*, *Anisoptera cochinchinensis*, *Mimusops elengi*, *Lagersthoemia floribunda*, *Lagerstroemia speciosa*, *Sindora chalandunensis*, *Pterocarpus indicus*, *Canarium* sp., *Terminalia* sp., *Cinnamomum* sp. and *Aquilaria crassna*. Other species can be added to this priority list, if the Enterprise is sure that demand will reach thresholds where seed collection/production is economically viable.

Forest Seed and Planting Materials Enterprise

6, Nguyen Thanh Y St

Dist 1, Ho Chi Minh City

Tel: (84-8) 8296299

Fax: (84-8) 8456836

Contact Persons: Ms. Banh Ngoc Tam (Deputy Director); Mr. Millet (EU Project Coordinator)

8. Institute of Agricultural Science of South Vietnam (IAS)

The Institute of Agricultural Science of South Vietnam (IAS) is a multi-disciplinary research organization established in 1990 for crop and livestock research. It offers graduate level training for scientists. It is affiliated with 5 other agricultural research centers in the southern part of the country and also work with several NGOs and international agencies. IAS has a staff of 375 scientists. It serves a similar purpose as, and collaborates with, VASI in the northern part of the country. Each operates independently. IAS's focus is the development of farming systems and technologies to reclaim degraded sloping lands. Its research is mostly on food crops, but fruit and fodder species are important secondary components. The main fruit species are: *Anacardium occidentale* (cashew), *Durio zibethinus* (durian), *Citrus* sp., *Mangifera indica* (mango), *Morus* sp. (mulberry), *Nephelium lappaceum* (rambutan), *Garcinia mangostana* (mangosteen), *Artocarpus heterophyllus* (jackfruit), *Dimocarpus longan* (chiku longan) and *Persea americana* (avocado). Priority fodder species are mainly leguminous nitrogen-fixers: *Acacia*, *Flemingia*, *Gliricidia*, *Leucaena* and *Tephrosia* species. Leguminous cover crops (for fodder, green manure and soil conservation), fodder grasses and vetivar grass are also widely used in IAS activities. Farmers want assistance from IAS with the development of upland rainfed agroforestry systems that focus on fruit trees, both those species mentioned above and valuable indigenous species. This would be a very useful focus for a tree domestication effort. Main objectives related to such an effort would be: i) selecting and testing fruit species and varieties; ii) the production and distribution of quality germplasm; iii) the development and evaluation of management systems; iv) the development of post-harvest and processing methods; and v) marketing research.

Institute of Agricultural Science of South Vietnam (IAS)

121, Nguyen Binh Khiem St

Dist 1, Ho Chi Minh City

Tel: (84-8) 8291746; 8297889

Fax: (84-8) 8297650

E-mail: syatem@ias.ac.vn

Contact Persons: Prof. Mai Van Quyen (Deputy Director); Dr. Nguyen Tang Ton (Head, Dept of Planning Resource Management and International Relations)

9. Research Center for Forest Ecology and Environment (RCFEE)

Currently, the main focus of Research Center for Forest Ecology and Environment (RCFEE) is indigenous knowledge of plant species. Funding for this work is received from the International Development Research Center (IDRC, Canada) and the Ford Foundation. The main premise of this project is that indigenous plant species of importance to local farmers are being replaced by exotics, because the exotics grow well on the degraded, barren hill slopes common throughout the north. Those indigenous species still available in natural forests or elsewhere are collected for sale on local markets. The exploitation of these markets by Chinese traders has put heavy pressure on the remaining natural forests leading to the extinction of some species. The project is documenting traditional management systems in order to conserve, and expand through domestication, populations of valuable, but endangered, indigenous species. The objective is to integrate the species into smallholder systems, thus achieving diversification of farm production and income simultaneous with biodiversity conservation. Several species have been identified as suitable for domestication under smallholder homegarden conditions. These are bamboo, rattan, *Indigofera teysmannii*, *Canarium album*, *Canarium nigrum*, *Canarium cochinchinensis*, *Illicium verum* and medicinal herbs. All the species mentioned have high commercial value and established market. Obstacles to domestication include: i) a shortage of germplasm; ii) a lack of propagation and management information; and iii) poor performance of indigenous species on the degraded sites available for planting.

Research Center for Forest Ecology and Environment (RCFEE)

Chem Tu Liem, Hanoi

Tel: (84-4) 8347434

Fax: (84-4) 8345722

E-mail: hxyt@netnam.org.vn

Contact person : Dr Hoang Xuan Ty (Director)

10. Research Center for Forest Tree Improvement (RCFTI)

The Research Center for Forest Tree Improvement (RCFTI) is currently engaged in tree breeding programs and the selection of superior provenances and species. Their research concentrates on *Acacias*, *Eucalyptus* and *Pinus* for industrial production. The *Acacia* hybrid of *Acacia mangium* x *Acacia auriculiformis* produced by the RCFTI show vigorous growth, reaching a height of 6-8 m in 2 years, and 13 m in 5 years. Interspecific hybrids of *Eucalyptus* using *Eucalyptus urophylla* x *Eucalyptus exserta* also perform well. Transgenic *Eucalyptus* hybrids have been produced with lower lignin contents. Studies are in process involving *Acacia defecilis* as a possible industrial tree crop for dry sandy soils of southern Vietnam. Two node clonal cuttings are successfully used for multiplication of *Acacia* hybrids. *Pinus* hybrids (*Pinus caribaea* var. *hondurensis* x *Pinus eliottii*) have shown good potential. The Center is concerned with the unauthorized collection of seed from hybrid plantations because the F2 seed performs poorly resulting in negative publicity for the hybrids. This has been a difficult situation to address. Some work has also been conducted on *Casuarina equisetifolia*, *Melaleuca leucadendra*, *Manglietia glauca* and *Tectona grandis*. *Erythrophloeum fordii* (ironwood) is being planted under established *Acacia* plantations to increase site productivity and expand populations of this indigenous species. *Erythrophloeum* is slow growing, producing a very hard and valuable wood. It grows in areas with as little as 600-800 mm annual rainfall. RCFTI has cooperative activities or relations with organization across that region, as well as in Australia, Sweden and Denmark. Farmers have access to improved planting materials from RCFTI. Farmers prefer rotations of 4-7 years for their private plantations. Germplasm supply, management information and training (specifically in propagation, hybrid management and related topics) are areas of need for smallholder domestication and potential areas of collaboration between farmers and RCFTI.

Research Center for Forest Tree Improvement (RCFTI)
Forest Science Institute of Vietnam
Chem Tuliem, Hanoi
Tel.: (84-4) 8347813
Fax: (84-4) 836280
E-mail: rcfti@netnam.org.vn
Contact Person : Prof. Le Dinh Kha (Director)

11. Vietnamese Agricultural Science Institute (VASI)

Established in 1993, the Vietnamese Agricultural Science Institute (VASI) is involved in: i) conducting basic and integrated research towards the development of agricultural strategies for Vietnam; ii) developing advanced technologies for diverse ecological conditions; and iii) training postgraduate students, technicians and skilled workers. The Institute has 12 departments, 250 scientists, and a total of 500 support staff. Main emphasis is on the production of food commodities such as rice, corn and potatoes. However there is a growing recognition that VASI should also focus on crops and systems that benefit smallholders. The strategy for smallholders is the promotion of forest and fruit trees in homegardens and on farmlands. VASI feels models should be developed to facilitate the development of viable timber/fruit trees farming systems. Species with high potential for domestication are fruits such as *Mangifera indica* (mango), *Citrus* sp., *Annona* sp., *Anacardium occidentale* (cashew) and *Durio zibethinus* (durian). Others include *Cinnamomum* sp., *Chukrasia tabularis*, *Michelia*, *Erythrophloeum fordii* (ironwood), and hybrids of *Acacia* and *Eucalyptus* species. VASI believes smallholder systems with these and other species are particularly appropriate for reclaiming degraded sloping lands. Already some farmers are using hybrid *Acacia*, but more information and planting material is required for expanding cultivation. In response to this need, VASI and collaborators are establishing clonal gardens of hybrids. The main problems hindering tree domestication are: species-site matching for different eco-zones; inadequate planting material and planting material distribution system; inadequate information on species and systems appropriate for smallholders; weak linkages between institutes involved in assisting smallholders; and low smallholder incomes, which makes it difficult for farmers to invest in tree farming systems.

Vietnamese Agricultural Science Institute (VASI)

Van Dien, Thanh Tri, Hanoi
Tel: (84-4) 8615480/5615970
Fax: (84-4) 8613937
E-mail: Cirad-ca@netnam.org.vn

Contact Persons: Ass. Prof. Ta Minh Son (Deputy Director); Mr. Le Quoc Doanh (Head, Dept Research Planning & International Co-operation); Mr. Ha Dinh Tuan (Coordinator, SAM project)

12. Xuan Mai Forestry College

Main activity of the Xuan Mai Forestry University is teaching. Some research, extension and training programs are also conducted. There are 200 staff in the university. Forty staff specialize in tree improvement and have the potential to assist with smallholder domestication activities. The university has a 450-ha experimental station and laboratories available for research. Degree programs are offered in silviculture, forest production, forest business management, wood processing, wood industry, and social forestry. Additionally, there are strong programs in fire management, wildlife management and wood marketing. The university has social forestry projects funded by several foreign donors. Related to domestication the University is involved with species trials, germplasm activities, marketing/policy analysis, and information production/dissemination. Species for domestication are prioritized by their utility for smallholders. *Madhuca pasqueri*, a tree yielding an oil-producing seed used for medicinal purposes and cooking (the oil is similar to

groundnut or sesame oil). Propagation and management techniques for *Madhuca* need further study. *Canarium album*, a fast growing fruit and timber tree, is popular among farmers, but poor flowering and fruit set has been a constraint for establishing market-oriented home gardens. Three other candidate species for domestication work are *Castanopsis boisii*, *Castanopsis neollissima* and *Cinnamomum cassia*. There is also opportunity to develop underplanting systems with *Acacia* and *Eucalyptus* plantations established by farmers for income generation. Farmers are particularly interested in intercropping with food crops and fruit species.

Xuan Mai Forestry College

University of Vietnam

Ministry of Agriculture and Rural Development

Administrative Building, Forestry University

Xuanmai, Hatay

Tel: (84-34) 840706

Fax: (84-34) 840540

E-mail: fcv@netnam.org.vn; sfsp.xm@vnn.vn

Contact Persons: Mr. Dinh Duc Thuan (Vice Dean); Mr. Pham Xuan Hoan (Deputy Dean, Silviculture)

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6. List of Acronyms

AACI = Apu Agbilin Community, Inc.
ACIAR = Australian Centre for International Agricultural Research
APAN = Asia-Pacific Agroforestry Network
ATSAL = Agroforestry Tree Seed Association of Lantapan
AWARE = Associated Workers Aimed to Rehabilitate the Environment
BAND = Bukidnon Association for National Development
BFI = Bukidnon Forests Incorporated
CAF = College of Agriculture and Forestry
CFSC = Central Forest Seed Company
CGIAR = Consultative Group on International Agricultural Research
CMU = Central Mindanao University
CPPAP = Conservation of Priority Protected Area Project
DANCED = Danish Cooperation for Environment and Development
DED = Diocesan Ecological Desk
DENR = Department of Environment and Natural Resources
ERDB = Ecosystems Research and Development Bureau
FAO = Food and Agriculture Organization
FICCO = First Community Credit Cooperative
FIPI = Forest Inventory and Planning Institute
FORDA = Forestry Research and Development Agency
FORGENMAP = Forest Genetic Resources Conservation and Management Project
FORTIP = UNDP-FAO Regional Forest Tree Improvement Project
FRC = Forest Research Centre
FSCS = Forestry and Soil Conservation Service
FSSIV = Forest Science Sub Institute of South Vietnam
GM = Green Mindanao
HESD = Highland Economic and Social Development Promotion Office
IAF = Institute of Agroforestry
IAS = Institute of Agricultural Science of South Vietnam
ICRAF = International Center for Research in Agroforestry
IDRC = International Development Research Center
IIRR = International Institute for Rural Reconstruction
INDO-NAS = Indonesian National APAN Secretariat
KIN = Kittanglad Integrated NGOs
LIPI = Lembaga Ilmu Pengetahuan Indonesia (the Indonesian Institute of Sciences)
LRSF = Land Rehabilitation and Social Forestry
MOAC = Ministry of Agriculture and Cooperatives

MOSCAT = Misamis Oriental State College of Agriculture and Technology
NGO = Non-Government Organizations
NHDFI = Northeast Hill tribes Development Foundation, Inc.
NPGR = National Plant Genetic Resources Laboratory
NVS = Natural Vegetative Strips
PCARRD = Philippines Council for Agriculture, Forestry and Natural Resources Research and Development
RCFEE = Research Centre for Forest Ecology and Environment
RCFTI = Research Centre for Forest Tree Improvement
RDCB = Research and Development Center for Biotechnology
S&T = the Department of Science and Technology
SANREM-CRSP = Sustainable Agriculture and Natural Resources Management Collaborative Research Support Program
UAP = UPLB Agroforestry Program
UGM = University of Gadjah Mada
UPLB = University of the Philippines at Los Banos
USAID = United States Agency for International Development
USDA = United States Department of Agriculture
VASI = Vietnamese Agricultural Science Institute

7. List of People Met

Name of Person	Institution
Indonesia	
Prof. Dr. Sjafrida Manuwoto	Center for Tropical Fruits Studies
Dr. Arie Budiman	Department of Microbiology
Dr. Chairul	Department of Phytochemistry
Dr. Suharisno	Directorate of Forest Tree Seed
Dr. Hadi Pasaribu	Directorate of Rehabilitation & Soil Conservation
Prof. Dr. Zahrial Coto Mr. Didik Suhardjito	Faculty of Forestry, Bogor Agriculture. University
Mr. Djoko Wasono	Forestry Seed Technology Center
Dr. Taulana Sukandi	Indonesian National APAN Secretariat
Dr. H. Moch. Muslich	Perum Perhutani
Dr. Timothy D. Roche	PT. Monfori Nusantara
Dr. Endang Sukara	Research & Development Center for Biotechnology
Ir. Dwiatmo Siswomartono	Research & Development Center for Forest & Nature Conservation
Mr. Sofyan Rushli	Research Institute Spice & Medicinal Crops
Philippines	
Mr. Harold Heath	Bukidnon Forests Incorporated-BFI
Prof. Herminia A Francisco	College Economics & Management
Dr. Pamela G. Fernandez	Department of Agronomy, UPLB
Prof. Victor B. Amaroso	Dept. of Biology, CMU
Prof. Thomas Austral	Dept. of Forestry, CMU
Dr. Celso Diaz Dr. Honoratio Palis	Ecosystem Research & Dev. Bureau- ERDB
Dr. Naptale Q Zabala	FORTIP Project
Mr. Augustin Mercado, Jr.	ICRAF Claveria Research Site
Dr. Samuel N. Koffa	ICRAF Lantapan
Prof. Romulo A del Castillo Dr. Rafael Cadiz	Institute of Agroforestry IAF, UPLB
Dr. Julian F. Gonsalves	International Institute of Rural Recons.-IIRR
Ms. M. Easterluna S. Canoy	Kitanglad Integrated NGOs
Dr. Juan A. Nagtalon	Misamis Orien State College of Agric. MOSCAT
Dr. Roberto Coronel Dr. Felipe S. de la Cruz, Jr.	Nat. Plant Gen. Resources Centre PGR Lab
Dr. Segundino U. Foronda	PCARRD - Forestry and Environment Division

Thailand	
Prof. Suree Bhumibhamon	Faculty of Forestry, Kasetsart University
Dr. Anders P. Pedersen	Forest Gen. Reso. Con. & Mgt. - FORGENMAP
Mr. Pricha Aramphongphun	Forestry Nursery Division Royal Forest Department
Mr. Songsak Tepsarn Mr. Leeseuk Rithnatikul Mr. A Thananon	Highland Econ. Social Dev. Prom. Office- HESD
Dr. David E. Thomas	ICRAF-Mae Chaem Watershed Research Site
Mr. Phrek Gypmantasiri	Multi-cropping Centre Chiang Mai University
Dr. Pitaya Petmak	Silviculture Research Division, Royal Forest Department
Dr. Patma Vityakon	Soil Science Department, Khon Kaen University
Vietnam	
Dr. Nguyen Duong Tai	Central Forest Seed Company
Dr. Bui Cach Tuyen Prof. Luu Trong Hieu Mr. Nguyen Van So	College of Agriculture and Forestry, National Universities University Ho Chi Minh City
Dr. Le Cong Kiet Mr. Nguyen Thien Tich	Department of Botany and Ecology, National Universities of HoChiMinh City
Dr. Nguyen Huy Phon	Forest Inventory & Planning Institute
Mr. Mai Dinh Hong	Forest Research Center
Mr. Ngo Duc Hiep Dr. Pham The Dung	Forest Science Sub Institute of South Vietnam
Ms. Banh Ngoc Tam Mr. Millet	Forest Seed & Planting Materials Enterprise
Prof. Mai Van Quyen Dr. Nguyen Tang Ton	Institute of Agricultural Science of South Vietnam
Prof. Le Dinh Kha	Research Center for Forest Tree Improvement
Dr. Hoang Xuan Ty	Research Centre for Forest Ecology & Environment
Ass. Prof. Ta Minh Son Mr. Le Quoc Doanh Mr. Ha Dinh Tuan	Vietnam Agricultural Science Institute
Mr. Dinh Duc Thuan Mr. Pham Xuan Hoan	Xuan Mai Forestry University

8. Appendices

Annex I: Focal Species for Domestication in Indonesia

<i>Acacia</i> sp	<i>Eucalyptus</i> hybrids	<i>Sandoricum koetjape</i>
<i>Acacia aulacocarpa</i>	<i>Eucalyptus pellita</i>	<i>Santalum</i> sp
<i>Acacia auriculiformis</i>	<i>Eucalyptus tereticornis</i>	<i>Santalum album</i>
<i>Acacia crassicaarpa</i>	<i>Eucalyptus urophylla</i>	<i>Shorea</i> sp
<i>Acacia hybrid</i>	<i>Eugenia aromatica</i>	<i>Sonchus avensis</i>
<i>Acacia mangium</i>	<i>Eurycoma longifolia</i>	<i>Swietenia macrophylla</i>
<i>Albizia</i> sp	<i>Eusideroxylon zwageri</i>	<i>Syzygium</i> sp
<i>Aleurites moluccana</i>	<i>Ficus deltoida</i>	<i>Tamarindus indica</i>
<i>Alstonia</i> sp	<i>Garcinia mangostana</i>	<i>Tectona grandis</i>
<i>Alstonia scholaris</i>	<i>Gliricidia sepium</i>	<i>Tephrosia vogelii</i>
<i>Amorphophallus campanulatus</i>	<i>Gmelina arborea</i>	<i>Toona sureni</i>
<i>Anacardium occidentale</i>	<i>Gnetum gnemon</i>	<i>Uncaria gambir</i>
<i>Andropogon natus</i>	<i>Gonoderma</i> sp	<i>Vanilla planifolia</i>
<i>Annona</i> spp	<i>Homalium tomentosum</i>	<i>Vetiveria zizanioides</i>
<i>Antidesma bunius</i>	<i>Intsia bijuga</i>	<i>Zingiber officinale</i>
<i>Arenga pinnata</i>	<i>Lansium domesticum</i>	
<i>Artocarpus altilis</i>	<i>Leucaena glauca</i>	
<i>Artocarpus heterophyllus</i>	<i>Macadamia integrifolia</i>	
<i>Azadirachta indica</i>	<i>Manilkara kauki</i>	
Bamboo species	Medicinal herbs	
<i>Calliandra</i> sp	<i>Nephelium lappaceum</i>	
<i>Calliandra calothyrsus</i>	<i>Octomeles</i> sp	
<i>Ceiba</i> sp	<i>Palaquium</i> sp	
<i>Cinnamomum</i> sp	<i>Paraserianthes falcataria</i>	
<i>Cinnamomum burmanii</i>	<i>Parkia speciosa</i>	
<i>Curcuma longa</i>	<i>Pericopsis mooniana</i>	
<i>Dalbergia latifolia</i>	<i>Peronema canescens</i>	
<i>Duabanga moluccana</i>	<i>Persea americana</i>	
<i>Durio zibethinus</i>	<i>Phyllantus acidus</i>	
<i>Dyera</i> sp	<i>Pinus merkusii</i>	
<i>Dyera costulata</i>	<i>Piper nigrum</i>	
<i>Elettaria cardamomum</i>	<i>Pogostemon cablin</i>	
<i>Eucalyptus</i> sp	<i>Pometia pinnata</i>	
<i>Eucalyptus deglupta</i>	<i>Pyrethrum</i> sp	
<i>Eucalyptus grandis</i>	Rattan species	

Annex II: Focal Species for Tree Domestication in the Philippines

<i>Acacia</i> sp	<i>Eucalyptus grandis</i>	<i>Shorea javanica</i>
<i>Acacia aulacocarpa</i>	<i>Eucalyptus pellita</i>	<i>Swietenia macrophylla</i>
<i>Acacia auriculiformis</i>	<i>Eucalyptus robusta</i>	<i>Syzygium aqueum</i>
<i>Acacia crassicaarpa</i>	<i>Eucalyptus torelliana</i>	<i>Syzygium nitidum</i>
<i>Acacia hybrid</i>	<i>Eucalyptus tereticornis</i>	<i>Tamarindus indica</i>
<i>Acacia mangium</i>	<i>Eucalyptus urophylla</i>	<i>Theobroma cacao</i>
<i>Acacia mearnsii</i>	<i>Eusideroxylon zwageri</i>	<i>Rapanea apoensis</i>
<i>Albizia lebeck</i>	<i>Garcinia mangostana</i>	<i>Zapoteca tetragona</i>
<i>Albizia procera</i>	<i>Gliricidia sepium</i>	
<i>Albizia saman</i>	<i>Gmelina arborea</i>	
<i>Anacardium occidentale</i>	<i>Grevillea robusta</i>	
<i>Artocarpus heterophyllus</i>	<i>Lansium domesticum</i>	
<i>Artocarpus odoratissima</i>	<i>Leucaena</i> sp	
<i>Averrhoa carambola</i>	<i>Leucaena diversifolia</i>	
<i>Azadirachta indica</i>	<i>Leucaena leucocephala</i>	
Bamboo species	<i>Lithocarpus ilanosii</i>	
<i>Calliandra calothyrsus</i>	<i>Macadamia integrifolia</i>	
<i>Calophyllum inophyllum</i>	<i>Maesopsis eminii</i>	
<i>Canarium</i> sp	<i>Mangifera indica</i>	
Cati-e	Mangrove species	
<i>Castanopsis javanica</i>	<i>Melia dubia</i>	
<i>Castanopsis philipensis</i>	<i>Morus</i> sp	
<i>Chrysophyllum cainito</i>	<i>Musa textilis</i>	
<i>Cinnamomum mercadoi</i>	<i>Nephelium lappaceum</i>	
<i>Dillenia philippinensis</i>	<i>Paraserianthes falcataria</i>	
<i>Dipterocarpus</i> sp	<i>Persea americana</i>	
<i>Dipterocarpus grandiflorus</i>	<i>Pinus caribaea</i>	
<i>Discocalyx cybianthiodes</i>	<i>Podocarpus imbiricatus</i>	
<i>Durio zibethinus</i>	<i>Podocarpus philippinensis</i>	
Ebony	<i>Psidium guajava</i>	
<i>Erythrina variegata</i>	<i>Pterocarpus indicus</i>	
<i>Erythrophleum fordii</i>	Sago	
<i>Eucalyptus</i> sp	<i>Sandoricum koetjape</i>	
<i>Eucalyptus camaldulensis</i>	<i>Senna siamea</i>	
<i>Eucalyptus deglupta</i>	<i>Shorea</i> sp	

Annex III: Focal Species for Tree Domestication in Thailand

Acacia sp
Acacia auriculiformis
Acacia hybrid
Acacia mangium
Albizia lebbbeck
Albizia procera
Albizia saman
Alstonia scholaris
Annona sp
Arenga pinnata
Artocarpus heterophyllus
Azadirachta excelsa
Azadirachta indica
Bamboo species
Camelia sinensis
Castanopsis sp
Casuarina equisetifolia
Casuarina junghuhniana
Chukrasia velutina
Citrus sp
Citrus grandis
Coffea arabica
Dimocarpus longan
Dipterocarpus alatus
Durio zibethinus
Eucalyptus sp
Eucalyptus camaldulensis
Eucalyptus grandis
Eucalyptus urophylla
Garcinia cambogia
Leucaena sp
Litchi chinensis
Mangifera indica
Melia azedarach
Musa sp
Parkia speciosa
Pinus kesiya
Psidium guajava
Pterocarpus sp
Pterocarpus macrocarpus
Rattan species
Senna siamea
Sesbania sp
Shorea sp
Tamarindus indica
Tectona grandis
Xanthoxylum lemonella

Annex IV: Focal Species for Tree Domestication in Vietnam

<i>Acacia</i> sp	<i>Erythrina poeppigiana</i>	<i>Melaleuca leucadendra</i>
<i>Acacia auriculiformis</i>	<i>Erythrina variegata</i>	<i>Melia azedarach</i>
<i>Acacia difficilis</i>	<i>Erythrophleum fordii</i>	<i>Melia dubia</i>
<i>Acacia hybrid</i>	<i>Eucalyptus</i> sp	<i>Michelia</i> sp
<i>Acacia mangium</i>	<i>Eucalyptus camaldulensis</i>	<i>Mimusops elengi</i>
<i>Azelia xylocarpa</i>	<i>Eucalyptus exserta</i>	<i>Moringa oleifera</i>
<i>Aleurites montana</i>	<i>Eucalyptus hybrids</i>	<i>Morus</i> sp
<i>Anacardium occidentale</i>	<i>Eucalyptus tereticornis</i>	<i>Nephelium lappaceum</i>
<i>Anisoptera cochinchinensis</i>	<i>Eucalyptus urophylla</i>	<i>Nypa fruticans</i>
<i>Annona</i> sp	<i>Euphoria longana</i>	<i>Oroxylum indicum</i>
<i>Aquilaria agallocha</i>	<i>Flemingia</i> sp	<i>Pahudia cochinchinensis</i>
<i>Aquilaria crassna</i>	Fodder grasses	<i>Parashorea chinensis</i>
<i>Artocarpus heterophyllus</i>	<i>Garcinia mangostana</i>	<i>Peltophorum</i> sp
Bamboo species	<i>Gleditsia ferrea</i>	<i>Peltophorum ferrugineum</i>
<i>Canarium</i> sp	<i>Gliricidia sepium</i>	<i>Persea americana</i>
<i>Canarium album</i>	<i>Gmelina arborea</i>	<i>Pinus</i> sp
<i>Canarium cochinchinensis</i>	<i>Hopea odorata</i>	<i>Pinus hybrids</i>
<i>Canarium nigrum</i>	<i>Illicium verum</i>	<i>Pinus kesiya</i>
<i>Cassia fistula</i>	<i>Indigofera teysmannii</i>	<i>Pinus massoniana</i>
<i>Castanopsis boissii</i>	<i>Khaya senegalensis</i>	<i>Pinus merkusii</i>
<i>Castanopsis neollissima</i>	<i>Lagerstroemia floribunda</i>	<i>Pterocarpus indicus</i>
<i>Casuarina equisetifolia</i>	Leguminosae	<i>Pterocarpus macrocarpus</i>
<i>Chukrasia tabularis</i>	<i>Leucaena</i> sp	<i>Pterocarpus pedatus</i>
<i>Cinnamomum</i> sp	<i>Leucaena glauca</i>	Rattan species
<i>Cinnamomum cassia</i>	<i>Leucaena leucocephala</i>	<i>Sapindus mukorossi</i>
<i>Citrus</i> sp	<i>Litchi chinensis</i>	<i>Sapindus saponaria</i>
<i>Corypha lecomtei</i>	<i>Litsea</i> sp	<i>Sapium sebiferum</i>
<i>Cunninghamia lanceolata</i>	<i>Livistona</i> sp	<i>Senna siamea</i>
<i>Cycas circinalis</i>	<i>Madhuca pasqueiri</i>	<i>Sindora chalidunensis</i>
<i>Cycas rumphii</i>	<i>Mangifera indica</i>	<i>Sindora cochinchinensis</i>
<i>Dalbergia bariensis</i>	<i>Mangifera minor</i>	<i>Spondias mangifera</i>
<i>Dimocarpus longan</i>	<i>Manglietia glauca</i>	<i>Sterculia lychnophora</i>
<i>Dipterocarpus</i> sp	<i>Markhamia stipulata</i>	<i>Styrax tonkinensis</i>
<i>Dipterocarpus alatus</i>	Medicinal herbs	<i>Strychnos nux-vomica</i>
<i>Durio zibethinus</i>	<i>Melaleuca</i> sp	<i>Swietenia macrophylla</i>
<i>Endospermum chinense</i>	<i>Melaleuca cajuputi</i>	<i>Syzygium nitidum</i>

Talauma gioi
Tarrietia javanica
Taxus baccata
Tectona grandis
Tephrosia sp
Terminalia sp
Thea sesanqua
Toona febrifuga
Trema orientalis
Vetiveria zizanioides
Wrightia tomentosa
Xylia dolabriformis