

# Forestry Department

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## Forest Genetic Resources Working Papers

*Regional Consultation Workshop on Forest Genetic Resources in  
Asia*

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### **For Quotation**

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## **1.0 Background**

The Commission on Genetic Resources for Food and Agriculture (CGRFA) acknowledged the urgency to conserve and sustainably utilize Forest Genetic Resources (FGR). The Commission requested that a *State of the World's Forest Genetic Resources* (SOW-FGR) report be prepared and presented to the Commission at its Fourteenth Session, in April 2013.

The SOW-FGR is prepared through a country-driven approach. Country Reports on FGR are the primary source of data and information for the preparation of the Global Report. Detailed guidelines for Country Reports were prepared to assist countries undertake a review of existing data and information, and to perform an assessment of the status and trends of FGR, including management capacities and needs. In this way, Country Reports both serve as strategic tool for national efforts to enhance the use, development and conservation of FGR, as well as provide the basis for preparing the global Report. FAO emphasized the importance of establishing national mechanisms to ensure the participation of national stakeholders in the preparation of the Country Report. FAO provided support to some countries in Asia to prepare their reports on FGR following the Guidelines provided.

Regional workshops to provide technical support for the preparation of Country Reports were organized in 2010 and 2011. Each workshop was an opportunity for FAO and its partners to provide technical assistance in the review of the initial drafts of Country Reports, assess progress made, discuss issues and limitations of their elaboration, and provide recommendations for finalization. The workshop for Asian countries was organized in March 2011, in Kuala Lumpur, Malaysia<sup>1</sup>.

A second series of regional synthesis workshops was organized in August and September 2012 to discuss the findings of the country reports. The workshops had two specific objectives:

- (i) to share main findings and recommendations of country reports for the SoW-FGR;
- (ii) to review, identify and finalize a regional synthesis report including needs, priorities for action at regional and global levels, and options for follow-up to the SoW-FGR.

### **1.1 Programme and participants of the workshop**

The regional synthesis workshop for Asia was organized in Kuala Lumpur, 12-14 September 2012 by FAO, in collaboration with APAFRI and Bioversity International. The programme of the workshop consisted of presentations of key findings and recommendations in the country reports by the national focal points; group discussions by sub-region to identify common achievements, constraints and action needs; and joint discussions to synthesize regional priorities and action needs in the conservation and management of FGR. The programme of the workshop is given in Appendix 1.

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<sup>1</sup> Report of the workshop is available at <http://www.fao.org/forestry/fgr/71289/en>

National focal points of SoW-FGR from 12 countries attended the workshop. Two members of the FAO Panel of Experts on Forest Gene Resources, Dr Baskaran Krishnapillay from Malaysia and Dr Wang Huoran from China were invited as resource persons, together with experts from FAO, APAFRI, and Bioversity International. List of participants is given in Appendix 2.

## **1.2 Opening remarks**

Mr Oudara Souvannavong of FAO thanked the countries for their efforts in preparing the SoW-FGR Country Reports. He described the notable achievements in reporting the status of FGR over the past decades. The FAO Panel of Experts on Forest Gene Resources, established in 1986, advises countries of the world on priorities for action in conserving and managing FGR. In Asia, efforts to assess, conserve and manage FGR sustainably started more than 20 years ago, and the SoW-FGR process, although first of its kind, has a solid foundation in the region.

A series of workshops in preparation for the SoW-FGR report was held in Asia, in years 2008, 2009 and 2011. The needs and priorities identified by the countries will form the basis for the Global Plan of Action FGR that follows the global SoW-FGR report. In that sense, completion of the Country Reports is not an end but rather a beginning – in the next phases, findings of the reports need to be analyzed and synthesized to define actions for improved conservation and sustainable use of FGR.

The next and remaining steps in the completion of the SoW-FGR report include

- A review of the draft SoW-FGR Report by the Intergovernmental Technical Working Group on FGR (ITWG-FGR) in January 2013
- Presentation of the Report to the CGRFA in April 2013
- Presentation of the Report to the Committee on Forestry (COFO), the United Nations Convention on Biological Diversity (CBD), and the United Nations Forum on Forests (UNFF) in 2014

Dr Sim Heok Choh of APAFRI and Mr Hong Lay Thong of Bioversity welcomed the participants to the workshop and to Kuala Lumpur. They recognized the achievements of the Asia Pacific Forest Genetic Resources Programme (APFORGEN), which was established in 2003 with support from APAFRI, Bioversity and FAO, and has 14 member countries in the region. National focal points of APFORGEN have over the years prepared detailed reports on the status of FGR in their countries, which created an important foundation for the SoW-FGR process in the region.

## **2.0 Findings and recommendations from the Country Reports**

### ***China***

*Dr Zheng Yongqi, Chinese Academy of Forestry*

Collecting and conserving FGR is considered a long term effort that contributes benefits to the public. Research needs include better understanding of the resources, including those contained in *in situ* conservation areas; species prioritization; development of technical standards for FGR management; monitoring of the status of FGR; development of technologies for *ex situ* conservation; biotechnology; gene discovery; and innovative product development. A specialized research and development institution on FGR is needed to coordinate collection, research and policy support related to FGR. Use of FGR is constrained by inadequate supply of quality seed; lack of technical support and market guidance for farmers to diversify species choices; lack of diversity in breeding programmes; and limited development of new varieties.

Policy and institutional frameworks should be strengthened by establishing a central agency to oversee FGR management and use; a national cooperative network on FGR; and by developing specific legislation on FGR and mechanisms for access and benefit sharing. Effective information systems are also needed to support sustainable use of FGR. Inadequate and project-based funding dominate in FGR conservation and management activities, and longer term programme-based funding should be strived for. In future China could be more actively involved in regional and international collaboration, and move from a support receiver towards own investments in collaboration.

#### *Discussion*

- China is being too humble in recognizing their role in the region as they have been involved in valuable South-South collaboration. Could China provide its know-how and financial support to other countries in the region?
  - o Collaboration specifically on FGR issues is still very limited. Currently there are no long term mechanisms to support such collaboration, and the work is project-based. Investments in conservation are often seen as having no return and are therefore less popular.

#### *India*

*Dr N. Krishna Kumar, Institute of Forest Genetics and Tree Breeding*

Nationwide Forest Surveys and Botanical Surveys of India have yielded information on the country's vast FGR. In total 272 species, almost 10% of all known species in the country, were prioritized through different priority setting processes. All these species are actively managed for productive gains. In total 195 of the species are also prioritized for environmental and social values, 261 species are considered threatened and genetic variability has been evaluated for 104 species. Non-timber Forest Products are very important and estimated to yield 70% of forestry revenue. Among others, medicinal plant conservation areas have been established to protect these valuable resources.

Action needs in FGR conservation and sustainable use include taxonomy studies, monitoring and evaluation of the resource, strategies for species management and recovery, monitoring of

invasive species, and preparing for climate change. Establishing new conservation areas and creating connectivity among the existing ones are restricted by limited land availability and resistance of local people towards expansion of protected areas. Incentives need to be created to support sustainable resource use and domestication instead of extractive practises. Studies on economic valuation of FGR goods and services, improved management of trees outside of forest, and traditional knowledge can contribute to sustainable use and increased benefits of FGR. Quality and supply of germplasm for plantations remains a constraint. More than half of the seed come from unregistered sources. Institutional capacity in FGR conservation and sustainable use could be improved through a national policy on FGR; establishing a nodal agency to coordinate all FGR related efforts; and developing integrated database on FGR.

Preparation process of the Country Report included two consultative workshops: one on Strategies for formulation of Forest Genetic Resources Management Network, and one national Stakeholders' Workshop.

#### *Discussion*

- The main shortcomings include lack of adequate financing, difficulty in species prioritization, and limited regional and international networking. Consolidating the numerous FGR activities in a holistic way remains is an important challenge.

#### ***Indonesia***

*Dr Agus Sriyadi Budi Sutito, Directorate General of Forest Protection and Nature Conservation*

Indonesia defines FGR as various forms of wild life, plants, fungi and micro-organisms. Use of forest resources is regulated by numerous licences. Non-Timber Forest Products such as bamboo and rattan are of high importance. Specific research and development activities to support conservation and sustainable use of FGR remain very limited, and knowledge of the resources is poorly documented. There are no specific species conservation programmes. Many ecosystems are not covered by the protected area network. *Ex situ* conservation is dominated by arboreta, and breeding and nursery production focus on commercial purposes with a limited diversity of species. Discrepancies in land use policies and tenurial conflicts further challenge sustainable resource use. A holistic approach to resource conservation needs to be adopted. More tangible benefits for the people from FGR must be created to support sustainable resource use. Regional networking on specific species would be beneficial.

A Genetic Resources Management Bill has been developed and is undergoing the legislative processes, but its completion may still require long time. Specific regulations on FGR are still lacking. A national committee on genetic resources exists under the Ministry of Agriculture, but it focuses on agricultural crops. As a result of the SoW-FGR process, a new unit on FGR was established under the

Ministry of Forestry. The country is hoping for guidelines on how to develop national strategies and action plans on FGR.

The preparation process of the SoW-FGR included establishing an advisory committee. National working group could not be established because of lack of resources. The Country Report was prepared mainly as a desk study but included several consultation meetings with different stakeholder groups.

### ***Philippines***

*Dr Elpidio Rimano, Ecosystems Research and Development Bureau (ERDB)*

Action needs for *in situ* conservation based on the comprehensive Country Report include studying endemic and economically important species, periodical assessments of the resource base, habitat rehabilitation, management of biodiversity in non-protected areas, and effective information management systems. Socio-economic and cultural practices, their impact on FGR, economic valuation studies and extension programmes are needed to support sustainable FGR use. *Ex situ* conservation and tree improvement efforts need to be supported by developing a database on priority species, promoting the use of native species and developing mass propagation for NTFPs.

### ***Discussion***

- What benefits does the government expect from REDD+?
  - o Plantations for C sequestration are planned to contribute to REDD+

### ***Nepal***

*Dr Hemlal Aryal, National Forest Division, Department of Forests (DOF)*

Nepal has prioritized 61 tree species. In total 49 tree species are threatened. Genetic variability has been partially evaluated for 7 tree species. Generally, policies and programmes on FGR are inadequate, considering the number of threatened flora. There are also no specific national programmes on FGR. Protected areas do not cover important ecosystems very well, and where seed stands exist, they are inadequately managed. Conservation needs include a reassessment of forest resources, monitoring of FGR, and assessing genetic erosion. Many species are also conserved on farm, and incentive policies are needed to support these conservation efforts. *Ex situ* conservation tends to be considered a lower priority than *in situ* conservation. Many breeding seed orchards exist, but materials and activities are not well documented. There is no gene bank on FGR in the country. Tree improvement programmes and new breeding seed orchards need to be established for priority species. More effective mass propagation is needed to supply for tree plantations. A botanical garden for high mountain species is also needed.

Seed cooperatives enable good seed delivery systems, and information is also effectively transferred along with seed. However, linkages between seed producers and seed suppliers are weak, as are coordination and control of quality seed supply. A new framework is needed to regulate tree seed supply, and seed cooperatives need strengthening. The knowledge of local people on FGR is not well recognized, and mechanisms for identifying the rightful holders of resources and information are weak. A formal mechanism to settle disputes is lacking. Access and benefit strategy needs to be developed and local capacity in understanding and managing intellectual property issues needs strengthening.

#### *Discussion*

- What are the specific roles of seed cooperatives, especially for non-commercial species? India is planning community seed orchards and is interested in similar approaches.
  - o Communities are licensed to manage seed resources. The cooperatives include the relevant stakeholders from the government, the farmers and private enterprises. The government has knowledge of the seed stands for non-domesticated species and such information can directly benefit the farmers. There is a need to facilitate the seed supply mechanisms and control undocumented seed.
- Does *Dalbergia cochinchinensis* (a proposed CITES species) grow in Nepal?
  - o There are two native *Dalbergia* species, *D. latifolia* and *D. sichuensiensis*
- What is the role of non-protected areas in *in situ* conservation?
  - o Non-protected areas can importantly contribute to FGR conservation. One of the plans is to improve community forest management plans so that they integrate conservation activities for specific, locally important species whose populations are declining.

#### ***Lao PDR***

*Dr Chanh Samone Phongoudome, National Agriculture and Forestry Research Institute (NAFRI)*

Preparations of the Country Report have been initiated but have not progressed much since 2011 because of lack of funding. General constraints to FGR conservation and sustainable use include lack of a national strategy on FGR and lack of technical capacity. There are no geneticists to train students at the university and only a few taxonomists.

#### *Discussion*

- Oudara Souvannavong emphasized that the countries should use the available information for developing the Country Reports. There is no need to collect new data on FGR. The Country

Report can highlight major gaps in knowledge and urgent action needs even if little information is available on status of the FGR.

### ***Maldives***

*Mr Hussain Faisal, Ministry of Fisheries and Agriculture*

Development of the SoW-FGR Country Report was initially intended as part of the preparation of the National Forest Programme. Some consultative meetings and surveys were conducted, but preparation of the SoW-FGR Report has not progressed much since 2011. The country focal point has changed since 2011.

### ***Thailand***

*Dr Suchitra Changtragoon, Department of Research Office, National Parks, Wildlife and Plant Conservation*

Forest areas in Thailand have gradually declined, but were relatively stable in the 1990s due to strong measures implemented by the Thai Government. These measures included a ban on logging and an expansion of the area of conservation forests. Priority must be placed on increasing manpower and building capacity for conducting research. Critical areas requiring strengthening include estimates of genetic diversity, surveys of ecosystem abundance and natural regeneration, and surveys of habitat loss.

The country report on forest genetic resources will help to draw the attention of policy makers to the importance and critical status of forest genetic resources. A national forest genetic resources strategic action plan should be set up through relevant stakeholder consultations.

### ***Discussion***

- Countries in the region should identify ways to work together to understand the conservation and use status of important FGR of common interest
- Wildlife conservation and forest use are under the mandate of the same department. Is there any contradiction in practise between these two seemingly contrasting tasks?
- Is it possible to exchange genetic materials with Thailand?
  - o In principle exchange of materials is possible. Permission from the Plant Protection Commission is needed and a MOU must be signed to enable exchange.

### ***Bangladesh***

*Dr Ratan Kumar Mazumder, Forest Department*

Protected areas have been designated for *in situ* conservation. A system of co-management with the participation of local people is implemented for the conservation and management of protected areas. Five preservation plots have been established at different hill forest areas for *ex situ* conservation. Constraints include the unavailability of comprehensive information on population diversity of species, and forest species have been severely neglected. Poverty, shifting cultivation and the exploitative use of natural resources also contribute to the loss of FGR in the country. Preservation plots, sample plots and genebanks should be established to help conserve FGR, and a forest certification system should be introduced to promote sustainable forest management. Forest encroachment must be prevented by implementing stringent land leasing laws. Capacity of researchers and technicians on the latest knowledge of FGR, management and conservation methods as well as international collaboration needs to be strengthened.

#### *Discussion*

- Certain land types can be leased out, while it often poses FGR under threat. Political conditions and power relations make it very difficult to amend such policies.
  - o In India, land is not given out even to private corporations
  - o Philippines has several tenurial arrangements for forest land

#### ***Sri Lanka***

*Dr K. M. A. Bandara, Forest Research Centre*

Species of socio-economic potential, threatened and endemic species have been little studied and systematic evaluations of conservation values have not been conducted. A logging moratorium is imposed on natural forests but genetic erosion may still continue. No priority setting has been conducted for homegarden or natural forest species, and no species management programmes exist. Genecological zonation could help in FGR conservation but has not been conducted. *Ex situ* conservation is limited. Botanic gardens and arboreta are conserving some of the natural species. Exotic species are conserved in field gene banks which however are scattered. Accessions are not geographically representative. Threatened and endemic species should also be covered in *ex situ* conservation efforts. In general conservation efforts suffer from the knowledge on resources and lack of funds. Tree improvement programs have been implemented mainly for plantation species. Species use in homegardens is based on unimproved materials. Genetic variation of commercial species needs to be expanded. Seed centres should also be expanded. National programs on FGR should include characterization of model species, tree breeding, forest restoration and preparation for climate change.

Preparation process of the Country Report included establishment of a national committee, hiring a consultant to prepare the report, and two stakeholder consultations, with financial support from FAO.

## ***Republic of Korea***

*Dr Kim Yong-Yul, Korea Forest Seed & Variety Centre, Korea Forest Service*

The Country report will be completed by the end of 2012. A total of 389 species are classified as rare plant species in the country. Ongoing FGR conservation activities include development of genetic diversity evaluation techniques, genetic marker development, development of long-term seed storage techniques, and systematic surveys of endemic species in Korea. Development of propagation techniques and gene bank construction are also ongoing.

### *Discussion*

- Conservation of tree species with recalcitrant seed is a challenge for many countries in the region. Sharing of knowledge and methodologies would be useful.

## ***Bhutan***

*Dr Purna Chhetri, Department of Forest and Park Services, Ministry of Agriculture and Forest*

Bhutan is a melting pot of genetic diversity of flora from different continents and regions. More than 50% land area is protected, and timber production areas are few. Information on species uses has been compiled, and high numbers of species are used for different food, medicinal and other purposes. Constraints for sustainable use of FGR include lack of knowledge on genetic resources, habitat loss due to development, failure of natural regeneration in logged over areas, lack of knowledge on possible impact of climate change, lack of guidelines on the management of non-timber forest products, emerging land use conflicts, weak implementation and monitoring of FGR programmes, weak infrastructure for research and data management systems on FGR. The country would require support in solving these problems. Recommendations for future actions include identification and characterization of genetic resources of non-flowering plants, and the strengthening of training and teaching on FGR.

Preparation process of the Country Report included consolidation of results from a series of recent studies and consultation with stakeholders.

### *Discussion*

- It is hoped that the Country Report will help forest managers to understand the need for more information on the resources

### **3.0 Concluding remarks on the Country Reports**

Oudara Souvannavong concluded the presentation of the key findings and recommendations of the Country Reports by thanking the countries for their efforts. He expressed the hope that the preparation process of the reports was also useful for the countries themselves, quoting an example from the Solomon Islands. The country received a small catalytic support from FAO to prepare the Country Report. It became the first national report of its kind prepared fully by the country itself, without inputs from external consultants, and therefore became source of national pride. The preparation process helped to get the high ranking natural resource management officials to understand the importance of forest genetic resources. The recommendations of the report will subsequently be included in national programs and strategies on natural resources.

### **4.0 Preparation of a regional synthesis of needs and priorities for action**

Ms Riina Jalonen of Bioversity presented a preliminary synthesis of achievements, constraints and action needs in the region as identified in the Country Reports. Purpose of developing regional syntheses as part of the SoW-FGR process is to understand overall status and priorities of FGR conservation and management in the region, and identify common interests, needs, priorities for action. As such the synthesis can contribute to identifying opportunities for exchange and collaboration among the countries; communicating a coherent message from the region to inform global processes; and to better conservation, sustainable use and increased benefits of FGR.

#### ***4.1 Sub-regional working groups***

Participants formed three sub-regional working groups (East Asia, South Asia and Southeast Asia), with the objective to identify achievements, constraints and action needs in five areas

- Status of knowledge on FGR
- Management of FGR (including conservation)
- Institutions and policies
- Research, awareness and training
- Regional and international collaboration

The groups were also requested to identify sub-regional priority species for joint action. Species should include indigenous species for FGR conservation and use, not only species with tree improvement focus, and be of interest to several if not all countries in the subregion.

Summary tables of the achievements, constraints and action needs by subregion are given in Appendixes 3-5, and sub-regional priority species in Appendixes 6-8.

### ***Consolidation of the findings***

After the sub-regional working groups, one representative from each group met to consolidate the results to a draft regional action plan. The representatives from the groups were Dr Krishna Kumar (India), Dr Suchitra Changtragoon (Thailand) and Dr Zheng Yongqi (China). The draft was presented to the group for discussion and further amendments. The final version is given in Table 1. Regional priority species identified in joint discussion are given in Table 2.

### ***4.3 Discussion on the regional synthesis and action needs***

#### ***Policy integration and support***

- How to get the governments concerned of conservation and sustainable use of FGR? In many countries FGR are new topic and not considered a priority by the government. FAO could encourage countries in conservation and management of FGR and developing national strategies, action plans and policy frameworks
- Countries are encouraged to make every effort to integrate FGR in all relevant national strategies. This can help get them supported through national and international processes. For example, countries are now preparing to update their National Biodiversity Strategies and Action Plans (NBSAP). FAO has already written to national focal points of CBD to inform them about all the relevant processes that can contribute to NBSAP, including the SoW-FGR. Focal points of SoW-FGR should contact the CBD focal points in their countries and inform them about the work done under the SoW-FGR process.
- Policies on natural resource management are soft in some countries and have not been translated to legislation that could be enforced. There is a lack of policies and regulations to govern the involvement of private sector in FGR use.
- In India the states are required to develop their own forest policies. Moreover, all sectors and development interventions need to integrate forest issues in their strategies and action plans
- FAO has prepared a short, effective advocacy video on the importance of closing the gender gap in agriculture which can be freely downloaded and used for awareness-raising. Could FAO develop similar promotional video on the ecological and socio-economic importance of FGR, based on the findings of the SoW-FGR report, to help in awareness raising among the public and policy makers?

#### ***Research needs***

- NTFPs are very important for livelihoods, and their conservation and sustainable management require attention. However, NTFPs have not come up strongly in the discussions

- Conserving and supplying propagation material of species with recalcitrant seed are a problem and need a specific focus from research and actions. Very little research has been done on recalcitrant seed, partly because most timber species have orthodox seed.
- What kind of synergies there are between characterization of germplasm, tree improvement and timber tracking? Information collected on one topic could be used for many different purposes.
- Could FAO look specifically into research training and awareness in each prioritized research area, and think of specific interventions?
  - o Specific action points or plans should be identified for some of the action needs. Scope of research and training should be widened to include species important for livelihoods and other uses

### ***Funding***

- Research budget in Bangladesh was reduced by 50% over 20 years. In Sri Lanka FGR conservation is given quite high priority, but does not translate into research support. In India forestry receives only about 1% of total federal budget, and within that research budget is very limited. Reforestation and development-oriented activities are more popular than research.
- Biodiversity issues provide a very useful opportunity for integration of FGR considerations. GEF will provide support to the countries to implement their NBSAPs. REDD+ in theory provides funding for sustainable forest management, but quality of management is currently not always well integrated because of the strong focus on carbon only. However, REDD+ is a real funding opportunity that merits attention.
- Lack of funding always comes up as a constraint. In some cases it may be more of an issue of limited resource mobilization. For example, private sector within the country can be a good source of funds. Countries should not only wait for international institutions to act on their behalf.
  - o A small community in eastern Bhutan is managing a forest which provides ecosystem services in the form of clean water to a nearby town. The town pays a small amount for the watershed services.
  - o Corporate Social Responsibility initiatives are one opportunity to gather funds for FGR activities. However public-private partnership opportunities may be limited with regard to funding FGR activities. Private sector typically expects free research services from the government.
- Forest financing problems are cross-cutting issue. With its partners, FAO recently organized an international conference to assess the current status of forest financing, constraints and

opportunities (Organization-Led Initiative on Forest Financing, September 2012, <http://www.cpfweb.org/oli/en/>).

- Is there going to be support available from FAO for completing the yet ongoing SoW-FGR reports?
  - o It will be quite difficult to integrate findings from further Country Report submissions in the global SoW-FGR report, as the global report is scheduled to be completed in the near future. Best way to finalize the reports could be to integrate the efforts done so far in the NBSAPs. Findings can also be later integrated in the REFORGEN database which will be regularly updated.

### ***Species prioritization***

- Some knowledge exists on threatened species distributions and status but more is always needed (South Asia)
- For species of wide common interest, much research has usually been done already and resources are available. Priority or urgency of conservation and use activities may therefore be lower (Southeast Asia)
- Species may be important ecologically even if they occupy a small area. Country level prioritization may therefore be the best approach to identify species requiring attention. (East Asia)
- There is a risk in choosing a list of species which in the end no work is developed.
- It does not matter if the list is long. It can serve as an indication of regional consensus for reference or for use e.g. in proposal development.
- *Phyllanthus* sp. is not a priority for the South Asia sub-region but is recognized important in some countries. It is currently under the mandate of the agricultural department in India and therefore not included in the FGR report. (South Asia)
- China has high species diversity and much variation within the country, which makes prioritization difficult. However priority species for sub-regional collaboration can be identified quite easily. (East Asia)
- *Dalbergia* spp. are important to many countries in the region
- Natural teak stands are protected in many countries and more information is needed on the species.
- Medicinal plants should also be considered for priority species lists

## **5.0 Other presentations**

### ***APFORGEN***

Riina Jalonen presented results of an earlier survey among APFORGEN national focal points to initiate discussion on ways to activate the network and develop regional collaboration. According to the survey results, strengthening national programmes on FGR, enhancing networking and conservation of priority species were considered by the focal points as the most important objectives of APFORGEN. Focal points had benefitted from the network by receiving information on FGR research and sharing of experiences and good practices. Countries who participated in an ITTO-funded project on national capacity strengthening on FGR had also clearly benefitted through funding, support for identifying national priorities and tools for advocating the importance of FGR to policymakers. Practical collaboration among researchers in the region had, however, been limited. Awareness of FGR had improved in 90% of all countries that responded to the survey. Lack of concrete action plans and efforts for finding funding were considered as the main constraints for achieving the network objectives.

The network has not been active lately because of lack of funding for activities. Recommendations for enhancing the network on the basis of the survey included (i) designing activities for increasing target-orientation and commitment, e.g. through formulation of action plans, (ii) establishing working groups on topics of common interest such as species-based working groups, tree breeding, development of national programmes, germplasm exchange, access and benefit sharing, and training and education, (iii) developing research collaboration, (iv) including actions to support integration of FGR in wider policy processes, and (v) capitalizing the diverse expertise and roles of the focal points as a resource for the network.

### *Discussion*

- Generally it is difficult to get donors to support regional networks because networking does not produce immediate results, even if they can be important in supporting the member countries in many activities. However, if networks are perceived relevant in supporting policy formulation and implementation, they will be valued. For example, the European Forest Genetic Resources Programme (EUFORGEN) provides important and timely information on species and genetic resources to inform policy processes. It was established to implement the resolutions on FGR conservation and management of the Ministerial Conference on the Protection of Forests in Europe (MCPFE). EUFORGEN is well appreciated in the region and funded by the member countries.
- The East Asia Plant Variety Protection Forum is another example of a successful network. It was established as per the request by the ASEAN who also funds the forum. Activities are hosted by the member countries on a rotational basis. Available funding is channeled to prioritized activities.
- Asia - Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) was established as per the request by the president of China

- APFORGEN should seek higher visibility and recognition in the region. Linking it to high level meetings could be one way to gain visibility. For example, APFORGEN has always been invited to attend Asia - Pacific Forestry Commission (APFC).
- Ideally, APFORGEN could evolve in to a regional institute on the conservation and management of FGR
- Working groups could be initiated to identify common interests and establish contacts with people who share the same interests. Working groups could develop joint (research) proposals to attract funding and consolidate collaboration.
- Bioversity and APAFRI are happy to provide technical support to developing joint proposals and research activities which build on the interests and priorities of the countries themselves. They can also help connect with other regional and international networks and programmes such as EUFORGEN.

### ***DNA and stable isotope technologies to fight illegal logging***

Dr Marius R.M. Ekué, Scientific Coordinator of the project “Identification of Timber Species and Origins” talked about the use of DNA and stable isotope technologies to fight illegal logging. Illegal logging accounts for more than 50% of wood exported from the Amazon, Central-Africa, South-East Asia and Russia generating annually between US\$ 10-15 billion in criminal proceeds. There is a strong policy response to tackle the problem of illegal logging worldwide. Recent legislations (EU Action Plan on Forest Law Enforcement, Governance and Trade, USA Lacey Act, EU Timber Regulation, the USA Lacey Act, etc) are all prohibiting the placement of illegally harvested timber and timber products on the market of consumer countries. Unfortunately, the lack of practicable control mechanisms to identify the origin of timber and wood products means that an undetermined amount of illegal wood and wood products makes it to the market. Advances in science over the last years have made possible the use of new technologies, namely DNA and stable isotopes, to enhance existing timber tracking systems, which are currently opened to tampering. Genetic markers and stable isotopes use characteristics inherent to the timber instead of externally applied marks. They cannot be manipulated, reducing the possibility of falsifying accompanying chain-of-custody documents and laundering timber from unsustainable and illegal harvests. Marius showed practical application of the technologies for various tropical species: (1) to check species identity (e.g. mahogany), (2) to control the declared country of origin (e.g. merbau, mahogany and teak), (3) to control the declared concession of origin (e.g. Sapele and Iroko), (4) to track individual logs (e.g. merbau). To promote the use of such innovative tools at a global level, Bioversity International and the German Federal Ministry of Food, Agriculture and Consumer Protection have initiated the project “Identification of Timber Species and Origins”. The project will facilitate the practical application of timber species identification and timber tracking tools using genetic and stable isotope markers for a

number of priority timber species. Bioversity International is coordinating network of experts and institutes working with these tools (Global Timber Tracking Network or GTTN) to develop internationally accepted standards for genetic and stable isotopes fingerprinting of timber species, and to develop and maintain an online database with geo-referenced data on genetic structure and stable isotopes of major commercial timber tree species. GTTN will host the database and promote the integrated use of genetic and stable isotope fingerprinting techniques with the existing timber species identification and tracking systems, certification standards, regulations and legislation to curb illegal and unsustainable logging.

### ***Discussion***

- Which molecular markers will be used?
  - o Mostly chloroplast & nuclear microsatellites and SNPs. RAPDs will not be accepted, and AFLPs may be considered.
- Can anyone retrieve data from the database for comparison?
  - o The database will combine together the data, the analyses and interpretation. It will be designed to run analyses on the background and provide the answer to the users with interpretation and confidence interval. The user will not have access to the data used to build the database.
- Many countries are facing the constraint that samples cannot be sent out of the countries without official approval even for research purposes.
  - o Bioversity International is drafting a ***data sharing agreement*** that will address also such concerns
  - o The contribution of any institutes and research groups will be fully acknowledge on the website
- The same approach has been used in Korea for seed sources identification.

## **6.0 Conclusions**

Oudara Souvannavong emphasized that the key findings and recommendations of the country reports from the region indicate how the reports indeed have very interesting content. They explain important achievements in conserving and managing FGR and include lot of information on relevant national capacities. Lot of common issues and interests were also identified during the workshop, such as funding constraints and capacity strengthening needs. He again expressed his thanks to the countries for their important efforts to prepare the reports. The draft of the global SOW-FGR report will be presented to the Intergovernmental Technical Working Group on FGR (ITWG-FGR) in January 2013. There may be support available for country's representatives from developing countries to attend that meeting.

## 7.0 Annexes

### *Annex 1. Table of Regional synthesis of achievements, constraints and action needs*

<b>Area</b>	<b>Strengths and achievements</b>	<b>Constraints and weaknesses</b>	<b>Actions to be undertaken</b>
<b>Knowledge of FGR</b>	<ul style="list-style-type: none"> <li>- Information about species distributions gathered through inventories</li> <li>- Species biology and genetic diversity studied for some species on project basis</li> </ul>	<ul style="list-style-type: none"> <li>- Work has been done on a few, mainly commercial species only, and information on most of the species is still lacking (biology, genetic diversity, genetic erosion)</li> <li>- Lack of coordination and information sharing between people and institutions working on the same species</li> <li>- Research remains site-specific, localized, not comprehensive for a species</li> <li>- Little knowledge about genetic conservation value of protected areas</li> <li>- No systematic monitoring</li> <li>- Lack of long-term funding</li> </ul>	<ul style="list-style-type: none"> <li>- Create species information database to cover distribution, habitat, biology, genetic variation</li> <li>- Establish nodal action points for species to collate information and coordinate action</li> <li>- Make species information available for different stakeholders at different levels, including in local languages</li> </ul>
<b>Management of FGR</b>	<ul style="list-style-type: none"> <li>- National Biodiversity strategies and action plans</li> <li>- Protected area systems cover many species</li> <li>- Plans in place to increase forest and tree cover</li> <li>- Sustainable use of some species integrated in forest management plans (especially for widespread important species)</li> <li>- National research plans on tree improvement</li> <li>- Targeted species-based breeding programmes</li> </ul>	<ul style="list-style-type: none"> <li>- Multiple threats: Fragmentation, encroachment, mismanagement of FGR, fire, grazing, invasive and alien species</li> <li>- Difficulties in creating landscape connectivity because of lack of land availability</li> <li>- Limited knowledge about managing FGR for climate change adaptation and mitigation</li> <li>- Need for more gene conservation stands in different geneecological zones</li> <li>- Inadequate integration of FGR management and conservation in national level planning</li> <li>- Insufficient participation of people in managing and conserving FGR</li> <li>- Limited budgets</li> <li>- Lack of technical capacity in tree improvement programmes</li> <li>- No systematic programme for collection,</li> </ul>	<ul style="list-style-type: none"> <li>- Establish land use policy that specifically considers FGR conservation and management, and includes coordinated long term planning of sustainable use of FGR</li> <li>- Develop adequate policy frameworks to address FGR mismanagement</li> <li>- Effective laws and enforcement agencies</li> <li>- Increase livelihood benefits and poverty alleviation through FGR as well as community participation in FGR management</li> <li>- Forest management plans should put greater emphasis on FGR management</li> <li>- Develop technical standards, protocols and documentation for FGR management and conservation</li> <li>- Improve collaboration and networking on FGR C&amp;M approaches</li> <li>- Prioritize species for action</li> <li>- Develop and implement M&amp;E systems for FGR</li> </ul>

Area	Strengths and achievements	Constraints and weaknesses	Actions to be undertaken
<b>Research, Training, Awareness</b>	<ul style="list-style-type: none"> <li>- National networks available for FGR</li> <li>- FGR-centered institutes handling research</li> <li>- Significant contribution of knowledge from scientists and foresters in FGR research</li> </ul>	<p>production, distribution and use of quality seed</p> <ul style="list-style-type: none"> <li>- Inadequate technical and institutional capacity, including lack of trained manpower to handle FGR</li> <li>- Poor networking at national level among scientists to develop science on FGR</li> <li>- Inadequate use of novel research methodologies in characterization</li> <li>- Lack of infrastructure on research, storage facilities (specifically ex situ)</li> <li>- Lack of funding</li> <li>- No education programs to cover FGR in the forestry sector</li> <li>- Training materials are outdated</li> <li>- Lack of information on local languages</li> </ul>	<ul style="list-style-type: none"> <li>- Identify international channels for financial support (e.g. climate-related funds)</li> <li>- National seed programme to ensure availability of certified seed</li> <li>- Increase awareness of policy makers on the importance of FGR</li> <li>- Exclusive outreach programmes on FGR needed</li> <li>- Strengthen technical capacity of scientists by organizing research workshops on recent technologies and advancements and exposure visits</li> <li>- Incentives, recognition, awards for scientists and foresters working in the area</li> <li>- International organizations to support research coordination and enhancement</li> <li>- Develop training modules for FGR</li> <li>- Programme-based multi-objective breeding mechanism</li> <li>- Germplasm exchange mechanisms for research</li> </ul>
<b>Policies and Institutions</b>	<ul style="list-style-type: none"> <li>- Policies and institutional mechanisms as a framework for FGR conservation and management</li> </ul>	<ul style="list-style-type: none"> <li>- Inadequate law enforcement</li> <li>- No specific legal structures to cover FGR</li> <li>- Inadequate policies for stakeholder involvement</li> <li>- Inadequate in cross-sectoral coordination</li> <li>- Lack of access and benefit sharing mechanisms (cf. Nagoya protocol)</li> <li>- Lack of funding</li> </ul>	<ul style="list-style-type: none"> <li>- Establish supportive laws for conservation and sustainable use of FGR and enhance law enforcement</li> <li>- Establish better linkages and mechanisms for coordination and collaboration between agencies in technology, policy implementation, information sharing</li> <li>- Establish participatory mechanisms for FGR conservation, management and planning, and include FGR in livelihood programmes</li> </ul>
<b>Regional and International Cooperation</b>	<ul style="list-style-type: none"> <li>- Information exchange</li> <li>- Database development</li> <li>- Strategies for germplasm exchanges are available</li> <li>- Various networks (APAFRI, TEAKNET, NeemNet, IUFRO, APFORGEN)</li> <li>- International conventions with relevance to FGR (CBD, CITES, UPOV, UNFF, UNFCCC, UNCCD)</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of institutionalized mechanisms for international networking remain, in spite of facilitation efforts</li> <li>- Networks are not as functional as they could be (meetings, member enrolment, funding etc.)</li> <li>- Lack of policies for IPR protection</li> </ul>	<ul style="list-style-type: none"> <li>- International networking supported and strengthened on research, management and conservation approaches, policy and law issues</li> <li>- Technology transfer at regional level (in situ and ex situ conservation, breeding etc.)</li> <li>- Establish a regional forum for ABS</li> </ul>

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Area	Strengths and achievements	Constraints and weaknesses	Actions to be undertaken
	- Multilateral agreements promoting conservation and sustainable use of FGR		

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**Annex 2. Table of Regional priority species**

Species	Conservation		Exploration and collection		Evaluation		Use and Improvement		Countries	
	a	b	c	d	e	f	g	h		
<i>Acacia mangium</i> , <i>auriculiformis</i> , <i>crassicarpa</i>							1	1	India, China, Sri Lanka, Bangladesh, Philippines, Cambodia, Maldives, Thailand, Indonesia	
<i>Afzelia spp.</i>	1	1	1	1	1	1	1	1	Vietnam, Lao, Cambodia, Thailand, Myanmar	
<i>Albizzia spp.</i>	1	3	1	1	1	1	1	1	India, Bangladesh, Nepal, Sri Lanka, Myanmar, Indonesia, Lao	
<i>Aquilaria spp.</i>	1	2	1	1	1	1	1	1	India, Indonesia, Bangladesh, Lao, Cambodia, Vietnam, China, Nepal, Bhutan, Thailand, Sri Lanka, Malaysia	
<i>Bamboos</i>	1	1					1	1	India, Indonesia, Bangladesh, Lao, Cambodia, Vietnam, China, Nepal, Bhutan, Thailand, Sri Lanka, Maldives, Malaysia, Japan, Philippines, Korea	
<i>Casuarina spp.</i>		2					2	1	1	India, China, Sri Lanka, Bangladesh, Philippines, Cambodia, Maldives, Thailand, Indonesia
<i>Cryptomeria japonica</i>								1	1	Japan, Korea, China, Bhutan
<i>Dalbergia spp.</i>	1	1	1	1	1	1	1	1	1	Nepal, Bhutan, India, Pakistan, Bangladesh, Sri Lanka, Thailand, Lao, Cambodia, Vietnam, China
<i>Dipterocarpus</i>	1				1					India, Lao, Vietnam, Cambodia, Bangladesh, Philippines, Indonesia, Malaysia, Sri Lanka
<i>Eucalyptus spp.</i>	1	1						1	1	India, China, Sri Lanka, Bangladesh, Philippines, Cambodia, Maldives, Thailand, Indonesia
<i>Gmelina arborea</i>	1	1						1	1	India, Indonesia, Bangladesh, Lao, Cambodia, Vietnam, China, Nepal, Bhutan, Thailand, Sri Lanka
<i>Hopea spp.</i>	1				1					India, Lao, Vietnam, Cambodia, Bangladesh, Philippines, Indonesia, Malaysia, Sri Lanka, Maldives, Thailand
<i>Khaya spp.</i>		1					1	1	1	India, Philippines, Bangladesh, Sri Lanka, Malaysia, Indonesia
<i>Melia spp.</i>	1	1	1	1	1	1	1	1	1	India, Sri Lanka, Maldives, China, Nepal, Bhutan, Vietnam, Thailand
<i>Phyllanthus emblica</i>	1	1	1	1	1	1	1	1	1	Thailand, Lao, Bhutan, Nepal, India, Sri Lanka, Bangladesh
<i>Pinus koraiensis</i>	1	1	1	2	1	2	1	2	2	Korea, China, Japan, Russia
<i>Pinus roxburghii</i>	2	2	1	1	1		1	1	1	Bhutan, Nepal, India, Pakistan
<i>Pinus kesiya</i>	1	1					2	3	3	Thailand, Lao, Vietnam, Cambodia, Philippines, India
<i>Pinus merkusii</i>	1	1					2	3	3	Indonesia, China, Philippines, Thailand, Lao, Cambodia, Vietnam
<i>Pinus yunnanensis</i>	1	2	3	3	2	2	2	2	2	China, Vietnam, Lao, Myanmar
<i>Pinus densiflora</i>	1	1	1	1	1	1	1	1	1	Korea, Japan

<i>Populus spp</i>	1	1	1	1	1	1	1	1	China, Korea, India, Pakistan
<i>Pterocarpus spp.</i>	1	1	1	1	1	1	1	1	India, Indonesia, Bangladesh, Lao, Cambodia, Vietnam, China, Nepal, Bhutan, Thailand, Sri Lanka, Maldives, Philippines, China
<i>Quercus spp</i>	2				1		1	1	China, Korea, Mongolia, Japan, Nepal
<i>Rattan</i>	1	1					1	1	India, Indonesia, Bangladesh, Lao, Cambodia, Vietnam, China, Nepal, Bhutan, Thailand, Sri Lanka, Maldives, Malaysia, Philippines
<i>Santalum album</i>	1	1					1	1	Nepal, Bhutan, India, Bangladesh, Sri Lanka, Thailand, Vietnam, China, Indonesia
<i>Shorea</i>	1			1					India, Lao, Vietnam, Cambodia, Bangladesh, Philippines, Indonesia, Malaysia, Sri Lanka, Nepal, Maldives, Thailand, Bhutan
<i>Swietenia spp.</i>		2				1	1	1	India, Philippines, Bangladesh, Sri Lanka, Malaysia, Indonesia
<i>Tectona grandis</i>	1	3					1	1	Nepal, Bhutan, India, Myanmar, Bangladesh, Sri Lanka, Thailand, Lao, Cambodia, Vietnam, China, Indonesia, Philippines

Legend:

1: High priority; 2: Prompt action recommended; 3: important but less urgent than 1 and 2

- a) In situ
- b) Ex situ
- c) Ecological and biological information (natural distribution, taxonomy, genecology, phenology)
- d) Collection of genetic material (seeds, herbarium samples, ...) for assessment
- e) In situ (population study)
- f) Ex situ (provenance and progeny trials)
- g) Supply of seed and other reproductive material
- h) Selection and breeding

**Annex 3. Workshop Programme**

<b>REGIONAL WORKSHOP ON FOREST GENETIC RESOURCES IN ASIA 12-14 September 2012, Kuala Lumpur, Malaysia</b>	
<b>Programme</b>	
<b>Tuesday</b>	<b>11 September</b>
	Arrival of Participants
<b>Wednesday</b>	<b>12 September</b>
8.30 – 9.00	Registration
9.00 – 9.30	Opening - Programme and Objectives of the Workshop (APAFRI, Bioversity, FAO)
9.30 – 10.30	Presentation of key findings and recommendations of Country Reports on FGR China Korea
10.30 – 11.00	Coffee break
11.00 – 13.00	Presentation of key findings and recommendations of Country Reports on FGR (Cont.) Indonesia Lao Philippines Thailand
13.00 – 14.00	Lunch
14.00 – 16.00	Presentation of key findings and recommendations of Country Reports on FGR (Cont.)  Bangladesh Bhutan India Maldives
16.00 – 16.30	Coffee break
16.30 – 17.30	Presentation of key findings and recommendations of Country Reports on FGR (Cont.)  Nepal Sri Lanka
<b>Thursday</b>	<b>13 September</b>
8.30 – 9.30	Presentation of preliminary results of analysis of country reports and proposed process for identifying needs and priorities for action in sub-regional working groups (Bioversity, FAO)
9.30 – 10.30	Sub-regional working groups to identify needs and priorities for action
10.30 – 11.00	Coffee break

11.00 – 13.00	Sub-regional working groups to identify needs and priorities for action (Cont.)
13.00 – 14.00	Lunch
14.00 – 16.00	Sub-regional working groups to identify needs and priorities for action (Cont.)
16.00 – 16.30	Coffee break
16.30 – 18.00	Presentation of results by sub-regional working groups
<b>Friday</b>	<b>14 September</b>
9.00 – 9.30	Information on Global Timber Tracking Network – Identification of timber species and origins.
9.30 – 10.30	Presentation and discussion of draft regional synthesis of needs and priorities for action (Ad Hoc Working Group)
10.30 – 11.00	Coffee break
11.00 – 12.30	Presentation and discussion of draft regional synthesis of needs and priorities for action (cont.)
13.00 – 14.00	Lunch
14.00 – 16.00	Final synthesis and Closing
16.00	Coffee
Participants will leave Friday 14 evening or on Saturday 15 September, according to flight availability	

#### **Annex 4. List of Participants**

	<b>Country</b>	<b>Participant</b>
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## ***Annex 5. Achievements, constraints and action needs***

### **1) South Asia**

*Participants: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka*

<b>Area</b>	<b>Achievements</b>	<b>Constraints</b>	<b>Actions to be undertaken</b>
<b>Knowledge of FGR</b>	<ol style="list-style-type: none"> <li>1. Forest inventories, species inventory 50-80% inventoried</li> <li>2. Improvement of selected species in different stages</li> <li>3. Status of threatened and endemic species been understood</li> <li>4. FGR is included in the forest management plans</li> <li>5. Intra specific diversity understanding is at initial stages</li> </ol>	<ol style="list-style-type: none"> <li>1. In adequate knowledge on species distribution, biology genetic variation for most important tree species (no baseline information)</li> <li>2. Inadequate knowledge to undertake genetic level research</li> <li>3. Insufficient infra structure to carry out research and studies</li> <li>4. Narrow focus on selected few species</li> <li>5. Lack of capacity and funds to carry out conservation and management</li> <li>6. No program base approach- mostly project base</li> <li>7. Patchy information</li> <li>8. Difficulty to access of information –very scanty</li> <li>9. Unavailability of FGR information is in vernacular language</li> <li>10. Ethnic groups are usually conservative beyond the community</li> <li>11. Knowledge generation is weak</li> </ol>	<ol style="list-style-type: none"> <li>1. Baseline studies on biology and genetic studies and create data bases</li> <li>2. Enhance capacity building to stakeholders concern</li> <li>3. Need based management planning</li> <li>4. Specific budget for FGR</li> <li>5. Involve the beurocrats and politicians</li> <li>6. Information connectivity enhance</li> <li>7. Central databases should be developed</li> <li>8. Available FGR information has to be translated and communicated in vernacular languages</li> <li>9. Create incentive based motivation</li> <li>10. Integrate FGR programs into development framework</li> </ol>

<b>Management of FGR</b>	<p>In situ and ex situ</p> <ol style="list-style-type: none"> <li>1. PA system established</li> <li>2. Natural forest harvest is banned of some countries and other countries harvest for internal consumption only</li> <li>3. Plans in place in increase forest and tree cover in all countries</li> <li>4. Gene conservation is done by different approaches</li> <li>5. Tree improvement- few species in progress and at different stages</li> </ol>	<ol style="list-style-type: none"> <li>1. Lands are limited for gene conservation programs</li> <li>2. Fragmentation, encroachment, illegal logging, conversion of contiguous forests</li> <li>3. Difficulty to establish corridors</li> <li>4. Invasive, alien species</li> <li>5. Changes of forest types due to climate change and alien invasive species</li> <li>6. Low priority in FGR in national level planning</li> <li>7. People centric and product enteric management</li> <li>8. Inadequate funding</li> <li>9. No systematic program for production collection, certification and distribution of quality seeds, thereby affecting quality seedling production</li> <li>10. Inadequate technical skill to perform good tree improvement programs</li> <li>11. Inadequate prioritization of species for TAP regional Cooperation</li> <li>12. FGR is not included in livelihood programs</li> </ol>	<ol style="list-style-type: none"> <li>1. Define land use policy</li> <li>2. Control illegal logging and encroachment through policy interventions</li> <li>3. Coordinated effective long term development planning and supportive law enforcement</li> <li>4. Increase of community participation for FGR conservation and management</li> <li>5. Systematic written guidelines tree programs and regional cooperation to improve FGR activities</li> <li>6. Prioritizes species for regional cooperation</li> <li>7. Build FGR in livelihood programs</li> </ol>
<b>Research, Training, Awareness</b>	<ol style="list-style-type: none"> <li>1. Most countries have large number of FGR related institutes</li> <li>2. Researchers have contributed some extend to conserve, management and use of FGR</li> <li>3. Genomic research on pinus and eucalypts have been initiated in India</li> <li>4. Scientists and foresters have contributed to FGR</li> </ol>	<ol style="list-style-type: none"> <li>1. Inadequate research on characterization, evaluation, transferring to high-tech frontier technology</li> <li>2. Training are not very relevant and training materials are outdated</li> <li>3. No trained people for specific subjects such as taxonomy, dendrology, forest genetics, tree improvement</li> <li>4. No education for FGR</li> <li>5. Media coverage is very low</li> <li>6. Inadequate infrastructure facility</li> <li>7. Less funding</li> <li>8. Very poor net working on FGR (local, regional, national and international)</li> <li>9. Foresters and scientists working in FGR need better recognition.</li> </ol>	<ol style="list-style-type: none"> <li>1. Capacity building through exposure and exchange of scientists from there institutes</li> <li>2. Technology transfer</li> <li>3. Infrastructure development</li> <li>4. Upgrade training programme</li> <li>5. Development training models</li> <li>6. Increase regional training programs workshops on FGR</li> <li>7. FAO coordination and support in above programs</li> <li>8. Incentives awards and recognition to be given</li> </ol>
<b>Policies and Institutions</b>	<ol style="list-style-type: none"> <li>1. Some coverage is given by the available policies</li> </ol>	<ol style="list-style-type: none"> <li>1. There is no separate legal instrument to govern FGR</li> <li>2. CBD has no adequately addressed FGR</li> </ol>	

## 2) Achievements, constraints and action needs – Southeast Asia

Participants: Indonesia, Lao PDR, Malaysia, The Philippines, Thailand and Vietnam

Area	Achievements	Constraints	Actions to be undertaken
<b>Knowledge of FGR</b>	<ul style="list-style-type: none"> <li>• Forest inventories – 3 levels (Lao PDR) but other countries not as extensive</li> <li>• Have a List of threatened species</li> <li>• Have a List of species and what they are used for (timber, medicine, NFTP)</li> <li>• Projects on certain species</li> <li>• Thailand only – want to collaborate with neighbors (ex bamboo)</li> <li>• Some selection trials including clones</li> <li>• Knowledge of forest product use (Lao met every saw miller in country to determine species use and supply)</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of information on species, distribution and genetic variation</li> <li>• Still narrow focus on a few (country specific) valuable species</li> <li>• Research is still localize and not extensive enough within countries and between countries.</li> <li>• Land accessibility to complete trials and collect data.</li> <li>• Lack of systematic monitoring</li> <li>• Lack of government investment in knowledge of FGR program development</li> <li>• Sharing of information is good but compiling information is lacking</li> <li>• No committee for FGR by country to share knowledge and ideas</li> <li>• Knowledge of actions of forestry companies and groups in the country</li> <li>• Cost of books and information on FGR (PROSEA) and access to resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge required of genetic erosion and long term effects</li> <li>• Monitoring and evaluation of genetic erosion</li> <li>• Set up a FGR committee that goes across agencies to share knowledge on FGR and policy and research actions and changes.</li> <li>• Need more research and knowledge on socio-economic, cultural and ecological values.</li> <li>• Genetic variation in important species</li> <li>• Tree improvement needs more emphasis of valuable species (teak, eucalypts, pine)</li> <li>• Training and education in FGR</li> <li>• Information management systems (get information from all sectors and organizations)</li> <li>• Budget and jobs for taxonomy, ecologists and training</li> <li>• Strategy for education (getting young people interested)</li> <li>• Need national strategy for FGR</li> <li>• Websites to share information</li> </ul>
<b>Management of FGR</b>	<ul style="list-style-type: none"> <li>• National plan for biodiversity conservation</li> <li>• National research plan on forest tree improvement</li> <li>• Every 4 years there is a review of the ‘Strategy of national policy measures and plans on conservation and certain utilization of biodiversity’</li> <li>• Strategy and action plans for wildlife but not as much for biodiversity of plants.</li> <li>• Some studies on agroforestry (on farm FGR) in countries</li> <li>• Some coordination between sectors relating to</li> </ul>	<ul style="list-style-type: none"> <li>• Sectoral offices have to find their own budget for action in FGR</li> <li>• There is little Knowledge or acceptance of the importance of FGR in adaption and climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Need national plans for action.</li> <li>• FGR should jump into the climate change arena. Adaption through genetic diversity should be promoted.</li> <li>• Access funds through adaption fund and REDD+ process.</li> <li>• Plan for the development of botanical gardens (Indonesia)</li> <li>• Need more collaboration networks involved in FGR management not just personal relationships and casual meetings.</li> </ul>

	<p>FGR management</p> <ul style="list-style-type: none"> <li>National breeding program in Philippines is led dept of Environment and natural resources with other research centers who support the program)</li> </ul>		
<b>In situ</b>	<ul style="list-style-type: none"> <li>Protected areas systems in each country</li> <li>Some genetic conservation stands</li> <li>Tree species in protected areas are part of the management plan. (ecological – pines)</li> <li>Members of GMS initiative</li> </ul>	<ul style="list-style-type: none"> <li>Good systems but there are still problems (eg government actively tries to get land for economic use from natural forests – plantation development</li> <li>Mismanagement of in situ resources</li> <li>High demand for logs (dibergia) means illegal logging keeps occurring even with bans.</li> <li>Expanding of industrial species areas and those for agriculture</li> </ul>	<ul style="list-style-type: none"> <li>Need more genetic conservation stands or ecological zones</li> <li>Control of illegal logging</li> <li>Good policies for in situ conservation from the government</li> </ul>
<b>Ex situ</b>	<ul style="list-style-type: none"> <li>Gene banks in some countries</li> <li>Collections of germplasm including rattan and bamboo (Philippines)</li> <li>Trial/arboretum/botanical gardens areas Thailand 72 species,</li> <li>Trials Lao 18 species,</li> <li>Trials Indonesia medicinal plants (850 sp.),</li> </ul>	<ul style="list-style-type: none"> <li>Cost of collection and management</li> <li>Illegal cutting</li> <li>Land availability for Ex situ species plantings</li> <li>Mostly in botanical gardens and arboretum</li> </ul>	<ul style="list-style-type: none"> <li>National botanical garden for Lao PDR while other countries have them.</li> <li>Priorities species and greater emphasis on conservation</li> </ul>
<b>Sustainable resource use</b>	<ul style="list-style-type: none"> <li>Reduced dependency on natural forests</li> <li>Forest management contributing to conservation</li> </ul>	<ul style="list-style-type: none"> <li>Overexploitation of valuable species</li> <li>Accessibility of land is a constraint</li> <li>Forest fires</li> <li>Encroachment from shifting cultivation</li> <li>Issues of invasive species encroachment</li> </ul>	<ul style="list-style-type: none"> <li>Promote use of other woods than valuable woods such as teak.</li> <li>Manage trees outside the forest such as agroforestry crops</li> <li>Encourage forest plantations over natural forest use</li> <li>Promote natural reforestation programs with original species if available</li> </ul>
<b>Research, Training, Awareness</b>	<ul style="list-style-type: none"> <li>Seed orchards, species trials</li> <li>Provenance trials</li> <li>Some hybrids from acacia and clones for eucalypt (mostly private companies)</li> <li>Teak research</li> <li>Focus on medicinal plants and aquilaria (Malaysia)</li> <li>Rubber in Thailand and Malaysia.</li> <li>Some seed transfer between countries</li> <li>There are institutions that undertake tree breeding in every country.</li> </ul>	<ul style="list-style-type: none"> <li>Not enough seed orchard areas and not enough species represented</li> <li>Not many species trials</li> <li>Land availability to ensure there is not pollination of trees from outside the trials</li> <li>Not enough money for research and training</li> <li>Some trees have irregular flowering patterns (4-7 years)</li> </ul>	<ul style="list-style-type: none"> <li>More seed orchards developed and more seedling trials</li> <li>Need long term breeding plans</li> <li>Molecular breeding – gets breeding system down to 1 generation (Malaysia)</li> <li>Need more money in research (more money more interest)</li> <li>Collaboration between public/private and between countries so no overlap and institutions and universities.</li> </ul>

<b>Policies and Institutions</b>	<ul style="list-style-type: none"> <li>• Laws to protect the environment</li> <li>• Seed quality must be certified (Philippines)</li> <li>• Phytosanitary certificates</li> </ul>	<ul style="list-style-type: none"> <li>• Enforcement</li> </ul>	<ul style="list-style-type: none"> <li>• Good policies that are enforceable</li> <li>• More discussion with stakeholders to make good policies</li> </ul>

## 3) Achievements, constraints and action needs – East Asia

Participants: China and Republic of Korea

Area	Achievements	Constraints	Actions to be undertaken
<b>Knowledge of FGR</b>	<ul style="list-style-type: none"> <li>• Available information on species diversity, ie. Number, distribution;</li> <li>• Available information on Genetic variation and diversity of main reforestation species been studied through field and laboratory tests;</li> <li>• Basic FGR C&amp;U system established</li> </ul>	<ul style="list-style-type: none"> <li>• Too many species to work on, need prioritization;</li> <li>• Declining intra-specific diversity of main tree species;</li> <li>• Negative Impacts of Climate Change</li> <li>• Deforestation and land use change;</li> <li>• Limited available information on biology of less-known species</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthen national coordination of activities in FGR, e.g. information, researches, uses, etc</li> <li>• Assessment/monitoring of genetic diversity of identified species with important and potential economic values;</li> <li>• Awareness raising of government, public</li> </ul>
<b>Management of FGR</b>	<ul style="list-style-type: none"> <li>• National strategy available</li> <li>• FGR utilized through breeding programs, e.g. SO, SPA, etc; with significant genetic improvement;</li> <li>• Conservation by nature reserves (In situ) and Field genetic trials (ex situ), storage facilities established for important (endangered, timber production) species providing good protection;</li> <li>• Favorable policy on protection (e.g. Natural forest protection program)</li> </ul>	<ul style="list-style-type: none"> <li>• Information on genetic diversity/variation of many species still unavailable;</li> <li>• Insufficient studies on FGR conserved in situ;</li> <li>• Insufficient participation/involvement by local people in FGR activities</li> <li>• Lack of storage and propagation methods</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a monitoring/evaluation system for conserved FGR;</li> <li>• Development of technical standards for FGR management.</li> </ul>
<b>Research, Training, Awareness</b>	<ul style="list-style-type: none"> <li>• National research network on FGR established;</li> <li>• National information system of FGR established providing useful data;</li> <li>• Awareness of FGR increased</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of appropriate financing mechanisms for FGR activities;</li> <li>• Lack of specific curriculum on FGR in universities;</li> <li>• Lack of diversity in breeding objectives,</li> <li>• Lack of capacity building for research, training and awareness</li> <li>• The society lack of understanding as to the importance of genetic diversity, namely the intra-species genetic diversity</li> </ul>	<ul style="list-style-type: none"> <li>• Development of storage (long-term storage for recalcitrant seed-species) and propagation methods for species with no seed production;</li> <li>• Strengthen dissemination and education activities, public awareness of FGR</li> <li>• Create a long-term multi-objective breeding mechanism, to formulate incentive policies of encouraging stakeholders participation in the utilization and management of the genetically improved seeds.</li> </ul>

<b>Policies and Institutions</b>	<ul style="list-style-type: none"> <li>• Technical standards such as the “Technical codes of setting in situ FGR conservation sites”, providing detailed specifications for selection of species and populations, size of conservation plots, characteristics of observation, collection of samples and subsequent protection measures of in situ conservation developed</li> <li>• Policy for protecting natural forest and the establishment and the protection of nature reserves of key species and typical ecosystems with national priority for protection</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of funding</li> <li>• Difficulties in cross-sector coordination</li> </ul>	<ul style="list-style-type: none"> <li>• Establish nature reserves and protected plots</li> <li>• Sustainable monitoring for species and genetic variation are undertaken</li> <li>• Maintaining various forest ecosystems that consist of various stand/tree ages by encouraging measures to promote</li> </ul>
<b>Regional and International Cooperation</b>	<ul style="list-style-type: none"> <li>• Information exchange, database development, development of conservation strategies, and seed exchanges carried out</li> <li>• Acceded to international conventions such as CBD, CITES, UNFCCC, UNCCD, UNFF and UPOV Convention and multilateral or bilateral agreements, therefore promoting the conservation and utilization of FGR</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of policies for IPR protection</li> <li>• Virtually no international collaboration on the forest tree genetic resources because of the abundance of native forest tree genetic resources in the nation and of little demands for introducing forest tree species.</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of a Regional forum on ABS</li> <li>• Priority of the future international collaboration on forest tree genetic resources would be regional/international workshops, training courses, and joint research on identified species</li> </ul>

## Annex 6. Sub regional priority species

## 1) South Asia

Participants: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka

SPECIES	Conservation		Exploration and collection		Evaluation		Use and Improvement		Countries
	a	b	c	d	e	f	g	h	
<i>Acacia auriculiformis</i>		1	1	1		1	1	1	
<i>A.mangium</i>		1	1	1		1	1	1	
<i>A.catechu</i>	1	2	1	1	1	1	1	1	Nepal,Butan
<i>Aquilaria aga</i>		1		1	2	1	1	1	
<i>A. malaccensis</i>		1		1	2	1	1	1	
<i>Artocarpus heterophyllus</i>	1	1	1	1	1	1	1	1	
<i>A. lakoocha</i>	3	1	1	1	1	1	1	1	Nepal, Bhutan
<i>Azadirachta indica</i>		1	1	1	1	1	1	1	
<i>Albizia.lebbek</i>	1	1	1	1	1	1	1	1	
<i>A. odoratissima</i>	1	1	1	1	1	1	1	1	
<i>A. procera</i>	1	1	1	1	1	1	1	1	
<i>Casuarina equisetifolia</i>		1	2	2		1	1	1	
<i>Adina cordifolia</i>	1	1							
<i>C. junghuhiana</i>		1	2	2		1	1	1	
<i>Dalbergia sissoo</i>	1	1	2	1		1	1	1	
<i>D. latifolia</i>	1	1	2	1		1	1	1	
Dipterocarpaceae	1	1	1	1		1	1	1	
<i>Shorea robusta</i>	1	1	1	1	1	1	1	1	
<i>Eucalyptus grandis</i>		1							
<i>E. tereticornis</i>		1							
<i>E. camaldulensis</i>		1							
<i>Gmelina arborea</i>									
<i>Chukrasia tabularis</i>	1	1	1	1	2	1			
<i>Pinus spp.</i>	1	2	1	1		1	1	1	
<i>Pterocarpus spp.</i>									
<i>Santalum album</i>									
<i>Tectona grandis</i>	1	1	1	1	1	1	1	1	
<i>Michelia champacaka</i>	1	1							
<i>Khaya senegalensis</i>									
<i>Swietenia macrophylla</i>									
<i>Melia spp.</i>									
<i>Bamboo spp.</i>	1	1	1	1					
<i>Rattan spp.</i>	1	1	1						
<i>Terminalia spp.</i>									
<i>Chalophyllum</i>									
<i>Alnus nepalensis</i>									Nepal/Bhutan
<i>Choerospondia saxillaris</i>									Nepal/Bhutan
<i>Cedrus deodara</i>									Nepal/Bhutan
<i>Juglans regia</i>									Nepal/Bhutan
<i>Cinnamomum spp.</i>									Nepal
<i>Berrya corrdifolia</i>									Sri Lanka

## Legend:

Use 1, 2 and 3 to score the required activity for each species as follows:

1: High priority; 2: Prompt action recommended; 3: important but less urgent than 1 and 2

- In situ
- Ex situ
- Ecological and biological information (natural distribution, taxonomy, genecology, phenology)
- Collection of genetic material (seeds, herbarium samples, ...) for assessment
- In situ (population study)
- Ex situ (provenance and progeny trials)
- Supply of seed and other reproductive material
- Selection and breeding

## 2) Sub regional priority species – Southeast Asia

*Participants: Indonesia, Lao PDR, Malaysia, The Philippines, Thailand and Vietnam*

SPECIES	Conservation		Exploration and collection		Evaluation		Use and Improvement		Countries
	a	b	c	d	e	f	g	h	
<i>Dalbergia</i>	1	3	1	1	1	3	2	3	Thailand, Lao, Cambodia, Vietnam
<i>Pinus merkusii</i>	2	2	2	3	1	3	3	3	Indonesia, Philippines, Lao, Cambodia, Vietnam
<i>Rattan</i>	1	2	1	3	2	1	3	3	Thailand, Malaysia, Philippines, Indonesia
<i>Bamboo</i>	1	2	1	3	2	1	3	3	Indonesia, Lao, Cambodia, Vietnam, Thailand, Malaysia, Philippines,
<i>Tectona grandis</i>	1	3	3	3	1	3	3	3	Myanmar, Thailand, Lao, Cambodia, Vietnam ,
<i>Dipterocarpus</i>	1	3	3	1	1	1	1	1	Indonesia, Philippines Lao, Vietnam, Cambodia, Philippines, Indonesia, Malaysia
<i>Shorea</i>	1	1	1	1	1	1	1	1	Lao, Vietnam, Cambodia, Philippines, Indonesia, Malaysia, Thailand,
<i>Phyllanthus emblica</i>	1	1	1	1	1	1	1	1	Thailand, Lao
<i>Aquilaria</i>	1	3	1	1	1	1	1	1	Indonesia, Lao, Cambodia, Vietnam, Thailand, Malaysia
<i>Hopea</i>	1	1	1	1	1	1	1	1	Lao, Vietnam, Cambodia, Philippines, Indonesia, Malaysia, Thailand

## Legend:

Use 1, 2 and 3 to score the required activity for each species as follows:

1: High priority; 2: Prompt action recommended; 3: important but less urgent than 1 and 2

- a) In situ
- b) Ex situ
- c) Ecological and biological information (natural distribution, taxonomy, genecology, phenology)
- d) Collection of genetic material (seeds, herbarium samples, ...) for assessment
- e) In situ (population study)
- f) Ex situ (provenance and progeny trials)
- g) Supply of seed and other reproductive material
- h) Selection and breeding

## 3) Sub-regional priority species – Southeast Asia

*Participants: China and Republic of Korea*

SPECIES	Conservation		Exploration and collection		Evaluation		Use and Improvement		Countries
	In situ	Ex situ	Ecol-biol inform.	Coll. for assess.	In situ	Ex situ	Supply of repr. material	Selection and breed.	
1. <i>Acacia auriculiformis</i>									
2. <i>Acacia mangium</i>									
3. <i>Betula platyphylla</i>									
4. <i>Carya</i>									
5. <i>Castanea mollissima</i>		1		1		1	1	1	China, Japan, Korea
6. <i>Casuarina equisetifolia</i>									
7. <i>Chamaecyparis formosana</i>									
8. <i>Chamaecyparis obtuse</i>									
9. <i>Cryptomeria japonica</i>		1		2		2		1	China, Japan, Korea
10. <i>Eucalyptus camaldulensis</i>									
11. <i>Eucalyptus globulus</i>									
12. <i>Eucalyptus grandis</i>									
13. <i>Eucalyptus smithii</i>									
14. <i>Eucalyptus urophylla</i>									
15. <i>Eucalyptus grandis x urophylla</i>									
16. <i>Fraxinus mandshurica</i>	1	1		1	1	2	1	1	China, Japan, Korea
17. <i>Haloxylon ammodendro</i>									
18. <i>Hippophae rhamnoides</i>									
19. <i>Juglans mandshurica</i>									
20. <i>Juglans regia</i>									
21. <i>Larix olgensis</i>									
22. <i>Larix kaempferi</i>		1		2		2		2	China, Japan, Korea
23. <i>Phellodendron amurense</i>									
24. <i>Pinus caribaea</i>									
25. <i>Pinus densiflora</i>	2	2		2		1		1	China, Japan, Korea
26. <i>Pinus koraiensis</i>	2	2		2		1		1	China, Korea
27. <i>Pinus massoniana</i>									

SPECIES	Conservation		Exploration and collection		Evaluation		Use and Improvement		Countries
	In situ	Ex situ	Ecol-biol inform.	Coll. for assess.	In situ	Ex situ	Supply of repr. material	Selection and breed.	
28. <i>Pinus yunnanensis</i>									
29. <i>Populus deltoides</i>									
30. <i>Populus nigra</i>									
31. <i>Populus simonii</i>									
32. <i>Populus tomentosa</i>									
33. <i>Populus euphratica</i>	1	1	1	1		1	1	1	China
34. <i>Quercus mongolica</i>		1		1		1		1	China, Korea
35. <i>Quercus variabilis</i>									
36. <i>Tilia emurense</i>									
37. <i>Toona chinensis</i>	1	1		1		1		1	China, Korea
38. <i>Toona ciliata</i>									
39. <i>Zelkova serrata</i>	1	1		1	1	1		1	China, Japan, Korea
40. <i>Ziziphus jujuba</i>	1	1		1	1	1		1	China

Legend:

Use 1, 2 and 3 to score the required activity for each species as follows:

1: High priority 2: Prompt action recommended 3: important but less urgent than 1 and 2

- i) In situ
- j) Ex situ
- k) Ecological and biological information (natural distribution, taxonomy, genecology, phenology)
- l) Collection of genetic material (seeds, herbarium samples, ...) for assessment
- m) In situ (population study)
- n) Ex situ (provenance and progeny trials)
- o) Supply of seed and other reproductive material
- p) Selection and breeding