

Networking on conservation and use of plant genetic resources in Europe and Asia

## Report of the First International Meeting





# **DIVERSEEDS**

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## **Report of the First International Meeting**

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Bioversity International and FAO, Rome, Italy

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Hosted by Bioversity International, Rome, Italy  
In association with the ECPGR Inter-Regional Cooperation Network

### **Organizers**

The Organization for International Dialogue and Conflict Management, Austria  
The University of Birmingham, United Kingdom  
Secretariat of the European Cooperative Programme for Plant Genetic Resources  
Bioversity International

Front cover: Traditional medicine doctor in Thailand  
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## **1.0 First International Meeting: introduction**

### **1.1 Context of the First International Meeting**

The first DIVERSEEDS international meeting brought all DIVERSEEDS project partners from Europe and Asia together for the first time, providing an opportunity to intensify inter-regional discussions on issues regarding conservation and use of plant genetic resources (PGR). Before the regions started interacting with each other, it was necessary for them to have intra-regional discussions first. Three regional workshops took place, one in Europe (Slovenia, 5 October 2007), one in China (Beijing, 18 September 2007) and one in SE Asia (Hanoi, 28 September 2007). The outcome of all three regional workshops were discussed and taken forward at this First International Meeting. This procedure ensured that we agreed on intra-regional issues first (regional workshops) and then discussed inter-regional issues during the international meeting. As the term 'networking' in the project title indicates, the aim of DIVERSEEDS is not to discuss a particular topic but 'to establish a communication platform and to promote knowledge exchange on genetic resources' that will facilitate collaboration between the regions. The final selection of key issues for inter-regional dialogue has therefore to be made in order to meet these requirements and the First International Meeting was convened in order to meet this objective.

### **1.2 Meeting objectives**

The specific objectives of the First International Meeting were to:

1. Introduce DIVERSEEDS team members and external advisory board to each other.
2. Update participants on project activities and progress.
3. Discuss the International Treaty on Plant Genetic Resources for Food and Agriculture with the Secretariat of the Governing Body of the Treaty.
4. Have a joint meeting with the ECPGR Inter-Regional Cooperation Network and Bioversity.
5. Present and discuss the first round of regional workshops and their respective list of PGR issues.
6. Carry out a technical workshop consisting of four presentations.
7. Select key issues for inter-regional discussion.
8. Prioritize and define next steps for key issues.
9. Discuss the aims and requirements of the DIVERSEEDS electronic conference.
10. Discuss our public awareness activities.
11. Review plans for future workshops and meetings.
12. Attend to reporting and other administrative matters.

The meeting programme is presented in Annex 1.

### **1.3 Participant introductions**

The meeting participants introduced themselves, giving a short resume of their expertise and potential contributions to the DIVERSEEDS project. Markus Schmidt introduced the members of the External Advisory Board (EAB) who were unable to attend the meeting. A list of meeting participants and those unable to attend can be found in Annex 2.

### **1.4 Update on project activities**

Markus Schmidt provided an outline of the DIVERSEEDS project and an update on progress.

The primary aims of DIVERSEEDS are to:

- Open the European plant genetic resources (PGR) networks to Asian research colleagues working in centres of origin, to establish a communication platform and to promote knowledge exchange on genetic resources.
- Assist in the implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and contribute to overcome its gaps.

To achieve these aims, the DIVERSEEDS project has five basic steps:

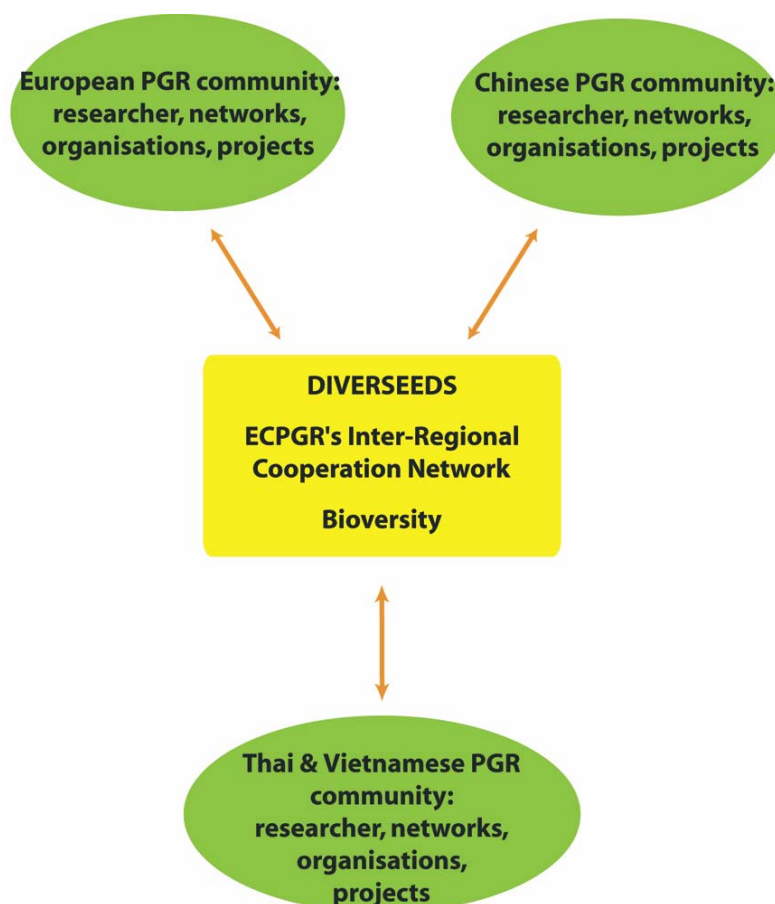
1. Identification of main PGR issues and stakeholders.
2. First regional workshops and international meeting.

3. Open discussion.
4. Second regional workshops and international meeting.
5. Dissemination.

Prior to the First International Meeting, the European and Asian partners independently identified and produced preliminary lists of key PGR issues. These issues were brought together into three lists—one for Europe, one for China and one for SE Asia (Thailand and Vietnam). Two Asian regional workshops have been held—one in China and one in Vietnam. The results of these workshops, together with the outcomes of the first European workshop, fed directly into the inter-regional discussions held during this first international meeting.

The DIVERSEEDS project will work in close collaboration with the Inter-Regional Cooperation Network of the European Cooperative Programme on Plant Genetic Resources (ECPGR) and Bioversity International, building on the collaborative links already fostered. Part of the First International Meeting was dedicated specifically to a joint session with ECPGR and Bioversity regional coordinators in order to discuss shared issues and potential collaboration with partners in the three regions represented by DIVERSEEDS. Figure 1 is a diagrammatical representation of the linkages that will be established and promoted by DIVERSEEDS.

**Figure 1. Collaborative links established and promoted by DIVERSEEDS**



## 1.5 Roundtable discussion with staff of the Secretariat of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

*Contributed by Shelagh Kell*

Before the start of the main DIVERSEEDS meeting held at Bioversity International Headquarters, the DIVERSEEDS partners attended a meeting at the Food and Agriculture Organization of the United Nations (FAO) with staff of the Secretariat of the Governing Body (GB) of the ITPGRFA. A presentation outlining the main provisions of the Treaty, followed by some of the most recent key developments was given by Dr. Shakeel Bhatti, Secretary of the Treaty. This was followed by a round of questions and discussions regarding the main challenges for the ratification and implementation of the Treaty from the point of view of the DIVERSEEDS partners.

Dr. Bhatti explained that the Treaty was adopted in 2001 after seven or eight years of negotiation and came into force in 2004—it had the fastest rate of ratification of any of the FAO treaties. He noted that Part III of the Treaty, which addresses farmers' rights, is the most important part as regards *in situ* conservation and that Part IV, the Multilateral System (MS), covering 64 crops listed in Annex I, is mainly implemented by the CGIAR (Consultative Group for International Agricultural Research) centres.

Regarding *in situ* conservation, the Treaty has several far-reaching and ground-breaking provisions, including:

- Article 5, which addresses the conservation, characterization, evaluation and documentation of PGR;
- Article 6, which addresses sustainable use of PGR.
- Article 9, which recognizes the contribution of farmers to PGR conservation and sustainable use, particularly in the centres of origin of crop plants;

Article 15 addresses *ex situ* conservation of PGR, which is implemented through the MS. Under the MS, the 116 Parties regulate access to and benefit-sharing of the 64 crops listed in Annex I by using Standard Material Transfer Agreements (SMTAs)—a contract adopted by the GB that lays out conditions of access and regulates how the benefits will be shared by the Parties. Dr. Bhatti stressed some of the benefits of the MS, which include free facilitated access to the genetic material of crops, exchange of information, transfer of technology and capacity building. As regards commercial benefit-sharing, there are two options—crop-based and product-based mechanisms. In cases where further use of the commercialized genetic material is restricted, the recipient is obliged to pay a percentage of the benefit of commercialization of the genetic material to the MS. In turn, this money is channelled into the funding strategy to benefit the Parties.

Dr. Bhatti outlined some of the recent key developments in the implementation of the Treaty. At the first GB meeting in 2004, the SMTA was adopted and implemented during 2007 by the CGIAR centres and some of the Parties. Initial results of the use of the system are very encouraging, with almost one thousand transfers from the CG centres alone. The need for the MS and commitment to its use has been clearly demonstrated. The pressure on the system has been enormous, with 400–500 agreements being dealt with each day. A new global system is needed to manage the transfers in a way that provides legal certainty to the Parties involved—the Secretariat of the GB is currently working to improve the system. One tool that has recently been developed is GenelT—a piece of computer software designed to auto-generate SMTAs in a legally accurate way. Also, a simplified means of reporting transfers to the GB has been developed, using an automated online system. This should be fully functional during 2008.

The second session of the GB was held at the end of October/early November 2007. During this meeting, a substantive work programme for implementation of the Treaty was adopted, as well as a resolution on farmers' rights. Mobilization of resources under the funding strategy was discussed and precise guidance on the implementation of the MS debated. The next session of the GB will be held in the first half of 2009.

Dr. Bhatti highlighted some of the ways that participants at this meeting could contribute to the implementation of the Treaty and opened the floor for discussion. He stressed the benefits of making material held in *ex situ* collections available via the MS through the provision of legal certainty as regards its use, and benefit-sharing (he also noted that the SMTA is currently being translated into several different languages to improve ease of use in a wide range of countries). As regards *in situ* conservation, participants can support the provisions of the Treaty through PGR collection, characterization, documentation etc. and by enacting legislation to recognize farmers' rights. Funding is available to Parties via the funding strategy and one of the priorities is *in situ* (mainly on-farm) conservation.

It was noted by the floor that assistance is needed by the Parties in developing a legislative base for the implementation of farmers' rights systems. Dr. Bhatti noted that the Secretariat had received requests from some Parties for draft legislation and that the Secretariat is in the process of developing a support system on several levels, offering integrated support on legislative, administrative and operational issues.

The ambiguity of the use of the term 'in the public domain' in the text of the Treaty was also raised and it was noted that Thailand has not yet ratified the Treaty because the meaning of some of the text is not clear—for example, whether information on accessions must be made available in the public domain. Dr. Bhatti noted that the Secretariat is in the process of documenting practices of how the different Parties are interpreting the words 'in the public domain'. He explained that during the negotiation phase of the Treaty, the words were introduced to describe the concept of material included in the MS but not under intellectual property (IP) law. In terms of IP law, 'public domain' refers to genetic material that is not protected by intellectual property rights (IPR) (e.g., through the application of patents or other forms of IP claims). However, ultimately the authoritative interpretation of the terms rests with the GB (i.e., the contracting parties).

The problems of resolving the interface between the MS and bilateral systems was also briefly discussed. For example, under Thai law, the benefits of commercialization should go back to the national fund. Dr. Bhatti noted that it is up to individual authorities to decide whether to regulate access and benefit-sharing nationally or through the MS, but that under the Treaty, such decisions would only apply to non-Annex I material.

The issue of the complexity of introducing SMTAs for transfer of Annex I material within the *in situ* conservation community was also raised. Dr. Bhatti noted that the GB has a working group addressing harmonization of approaches by the contracting parties.

It was noted that China and some other non-contracting parties are considering ratification. SMTAs have been translated into Chinese and although China has not yet ratified, they are already being used in the country. One of the problems facing large countries such as China is the complexity of the policy-making systems; therefore, it will probably be a long time before China ratifies the Treaty. A further obstacle for China and other non-contracting parties is the list of Annex I species. Dr. Bhatti acknowledged that some Parties see a need to review and revise the list, but noted that it is likely to remain static for some time because the list was carefully selected, based on criteria of inter-dependence and global food security.

Other points noted included the need to bring together legislators and biologists so that each can understand the issues involved in the implementation of the Treaty.

The DIVERSEEDS project coordinator, Markus Schmidt thanked Dr. Bhatti for his presentation and time spent answering questions and responding to the concerns of the project partners. The meeting attendees showed their appreciation in the usual way.

## 2.0 Reports of the first round of regional workshops

### 2.1 Report of the first regional workshop in Europe

*Contributed by Shelagh Kell*

The First DIVERSEEDS European Workshop was hosted by the Agricultural Institute of Slovenia, Ljubljana on October 5 2007, in association with the On-Farm Task Force of the ECPGR *In Situ* and On-Farm Conservation Network.

Key matters arising from the discussions held during the workshop on the European and Asian partners' list of PGR issues were outlined and classification of the European list of issues into five main categories introduced. Four selection criteria for the identification of issues of highest priority for inter-regional discussion from the European perspective were presented:

1. Issues where we have the necessary expertise and competence
2. Issues where our contribution—with our limited resources—can make a real impact
3. Issues that we want to learn about from colleagues in Asia
4. Issues that can be practically implemented.

Some key issues arising from the discussions on selection of priority issues were noted, including the need for appropriate tools and methods for access to and exchange of information in a standardized format.

A method for undertaking a preliminary ranking of the priority issues by the workshop participants was explained and four criteria for final selection of key issues for inter-regional dialogue were presented:

1. **Feasibility:** project partners should have the necessary expertise and competence
2. **Impact:** issues where we can make a real impact and that can be practically implemented
3. **Superposition:** issues that are of interest for all three regions
4. **Collaboration:** other activities that are planned/ongoing and that could provide an opportunity to collaborate.

Some of the networking and dissemination activities of DIVERSEEDS that were discussed during the workshop were outlined, and the need to secure funding for sustainability of the collaborative links established during the project was stressed.

A full report of the First European Workshop is available via the DIVERSEEDS project website.

### 2.2 Report of the first regional workshop in China

*Contributed by Wei Wei*

The First Chinese Workshop of DIVERSEEDS took place in IBCAS (the Institute of Botany, Chinese Academy of Sciences) on 18th September, 2007. It was organized by IBCAS, co-convened by the Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, (ICS-CAAS). This workshop invited experts from six scientific institutions, two state governmental administrations and one international organization. The full list of participants with their registration signature recorded 25 persons. However, some experts and students did not sign the address book.

The workshop included several invited talks that could initiate the following discussion on the issues of PGR conservation and utilization. The preliminary list of issues composed by Chinese partners was presented at the meeting as well as the list of issues from European participants. This meeting aimed to have the comments from Chinese experts and composed a new list of issues for the input for the first international meeting in Rome. In addition, this regional workshop intended for seeking any opportunity in the inter-regional dialogue and scientific cooperation between China and Europe. Thus we also took a session for the discussion in international cooperation opportunities and scientific questions

The workshop participants presented several comments on the pre-selected issues, among which the most important one is that 'A clear structure is better for the list of issues, i.e.

conservation, utilization and researches and policies etc'. Experts also argued on which is the best conservation strategy between *in situ* and *ex situ*. We also identified problems existed currently in China related to PGR conservation:

- Lack of systematic study, lack of basic study;
- Lack of funding especially on *in situ*;
- Problems in management;
- Safety of PGR exchange.

Participants proposed and identified several priorities issues for international cooperation:

- Basic theory on conservation biology and methodologies for conservation (e.g., sampling strategies, evaluation and identification of PGR);
- Adaptation and domestication of PGR: ecological evolutionary genomics;
- Gap analysis;
- Effect of gene flow on PGR (i.e., historical event of hybridization, current spontaneous hybridization, implication for biosafety);
- Genetic diversity of important traits in agronomy (e.g., reproduction, resistance).

The cooperation could be conducted in all kinds of manners (e.g., international and inter-institutions/countries projects, education etc.)

### **2.3 Report of the first regional workshop in SE Asia (28 September 2007, Hanoi University of Agriculture, Hanoi, Vietnam)** *Contributed by Nguyen Thanh Lam*

#### ***Introduction***

In agriculture, the widespread adoption of a few improved varieties has narrowed the genetic base of important food crops and led to the disappearance of hundreds of landraces (FAO, 1997). Conserving and using plant genetic diversity is vital in meeting the world's future development needs. Vietnam and Thailand are considered high biodiversity, but plant genetic resources are threatened by genetic erosion due to exotic plant invasion, marketing impact, global climate change (Nguyen *et al.*, 2006; Polthanee, 2007). Over the years, both KKU and HAU have experiences in plant genetic breeding and its conservation. Finally, the first regional Southeast Asian workshop was held at Hanoi University of Agriculture on 28 September 2007 under the DIVERSEEDS framework. The objectives were:

- To share experiences in conservation of plant genetic resources in Vietnam and Thailand;
- To identify PGR issues in both countries;
- To rank PGR issues for further recommendation on conservation of plant genetic resources in Vietnam and Thailand as well as in the Southeast Asian Countries.

Sixteen participants were invited from Hanoi University of Agriculture, Centre for Plant Genetic Resources, Institute for Agricultural Genetic Resources, Institute for Ecology and Biological Resources, Vietnamese seeds association, Vietnamese Academy of Agricultural Sciences (MARD), National Institute for medicinal materials, and Khon Kaen University. They were representing for researchers, policy makers in the both countries. Nine presentations were given in the workshop.

#### ***Contents of the presentations***

Firstly, Dr. Nguyen Thanh Lam presented introduction of the DIVERSEEDS project. The background of the DIVERSEEDS project is based on the ITPGRFA, which has come into action, and serves as a starting point and major guideline for DIVERSEEDS project in promoting a fair and equal access to plant genetic resources and to maintain agricultural biodiversity. However, some countries have not yet jointed the Treaty such as Vietnam and China as the Treaty fails somehow to be realistic in terms of the implementation of its proposed measures in the site specific conditions. The objectives of DIVERSEEDS are (i) to jointly elaborate a list of recommendations and strategies to improve the sustainable use of plant genetic resources; (ii) to distribute these recommendations to researchers, but also to policy makers, farmers and the general public. The main impact of this project is seen in its efforts to

increase the international dialogue on PGRFA, and its contribution to the implementation of the FAO Treaty on Plant Genetic Resources, especially in participating and neighbouring Asian countries.

Prof. Dr. Tran Dinh Long, the president of the Vietnamese Seeds Association presented *Conservation of Agricultural genetic resources in Vietnam*. Vietnam has 12,000 plant species, of which 7,000 species were identified, and 2,300 species used for food, folders, medicinal plants, timber and extracting oil (Long, 1995). However, PGR in Vietnam are on-going genetic erosion. Dr. Long introduced advantages and disadvantages of *in situ* and *ex situ* conservation in Vietnam.

Dr. La Tuan Nghia presented lessons learned from the project 'Indigenous plant species and their wild relatives in Vietnam'. He is the coordinator of the project 'Conservation of several local crop varieties and its relatives in Vietnam', Institute for Plant Genetic Breeding, Vietnam. Similar to Prof. Long, he introduced the advantages and constraints of *in situ*, *ex situ* conservation and lessons learned from his own project:

- *Ex situ*: Advantages: plant genetic resources are easy explored, clearly objectives for conservation, high efficiency. Disadvantages: these germplasms have not yet developed in their original conditions that lead to unstable of genetic resources, high cost for maintaining PGR.
- *In situ*: maintaining PGR under local conditions, participation of local communities, Disadvantages: requires a large area for conservation, impact from local community and government policies.
- Lesson learned: (i) *In situ* conservation of PGR is the best method in Vietnamese condition; (ii) Should be clearly identified what we need for conservation and why?; (iii) Identified conservation areas and its natural conditions; (iv) All conservation activities should be closely linked with local communities (v) Should develop suitable strategies for each specific conservation area; (vi) develop funds for conservation. The author introduced several *in situ* conservation places: upland rice and bean in Cao Bang grape in Hatay province, orange Sanh in Ha Giang province.

Dr. Poramate Banterng (Khon Kaen University - Thailand) presented 'Current status of survey, collection, and conservation of plant genetic resources in Thailand'. The author overviewed several institution/organizations carrying the tasks on conservation of PGR. Queen Sirikit Botanic Garden has established by the Thai Government since 1992. The Garden is a location of *ex situ* conservation of race species in Thailand. A number of researches on PGR were carried out in this Garden and they are disseminated. Plant Genetic Conservation Project under the Royal Initiative of her Royal Highness Princess Maha Charki Sirindhorn implemented for human resources development (capacity building) and collection and maintaining of PGR for sustainable development, which bring a multiple benefit to local people and the government. The project has eight activities: Protection of PGR, survey and collection of PGR, plantation and conservation of PGR, gene bank of plant Germplasm, Planning for plant resources development, raising awareness and understanding the benefit of PGR for local people, special support for conservation of PGR.

Dr. Ninh Khac Ban: presented 'Conservation of Agricultural Genetic Resources'. The author demonstrated potential, constraints, and lesson learned from his project:

- Potential of PGR: collaboration on PGR has been established among MARD, agricultural extension, researchers and local authorities in Vietnam. For the success of PGR conservation, the project should have a good design and plan for implementation; promote participation of local community, asking assistance and benefit sharing with local people, collaboration from project and local authority during implementation phases.
- Constraints: (i) Most researchers are outsiders, who spent only short time in the field/or with the community; (ii) Local farmers only familiar with native cultivars, and they are still lacking knowledge on new exotic cultivars; (iii) highly fluctuation of climate; (iv) Farmers still are interested in economic rather than environmental or long term aspects. The conservation activities stopped when project has gone; (v) policy is more focused on development than conservation; (vi) farmers are still depend on government/project subsidy; (vii) lacking

promotion system for marketing of traditional products.

- Lesson learned: Biodiversity is locally maintained in farmers' garden and their field crops from generation to generation. Cultural, Economic, and Social factors are influencing on farmers' decision making on collection, maintaining local cultivars. Farmers should be in the centre of focus during conservation of PGR, and farmer's participation is very important for the success. TOT training should be organized for farmers to better understand the roles of PGR conservation, the disadvantage of genetic erosion. PGR conservation should base on traditional practices, improving marketing channels, and promotion policy for encouraging farmer participation in conservation of PGR. The project should select potential farmers, who are willing to work and spend their time for *in situ* conservation. Dissemination activities should be diversified from papers, hand books, training, demonstration model, organizing festival, discussion, and workshop. PGR education should be organized at the schools.

Dr. Pham Thi Sen, Dr. Luu Ngoc Trinh's assistance, presented 'Conservation of plant genebank in Vietnam'. Vietnam has very high level of biodiversity, but genetic erosion is clearly evident. The government should pay attention for conservation of genetic plant resources. The author introduced several achievements /success in term of conservation of plant genetic resources in Vietnam, strategies, organization of PGR system from the government to provincial level. Results of PGR conservation: Vietnam has collected approximately 14,000 ancestors, which are from 120 plant species. Their characteristics, primary evaluations have been used for further breeding. Several potential cultivars were used in the farmer practices. Constraints and challenges for PGR are poor facilities for *ex situ* conservation, skill limited, low efficiency in PGR, lacking of a forecasting system on genetic erosion of PGR, local genetic resources located in remote hamlets with complex topography, lacking of suitable policy for PGR collections and conservation, on-farm conservation is still undeveloped. The author suggested several priorities for PGR such as survey and systematic auditing of PGR, raising efficiency of *ex situ* collections; capacity building and popular conservation of PGR, investments for *in situ* conservation facilities, policy for PGR (to promote participation of local communities in PGR, conservation and development of PGR, equality among beneficiaries, support local species, improvement of seeds supply system, etc.).

Dr. Vu Van Liet, vice-rector of Hanoi University of Agriculture, presented 'Local plant genetic resources (maize and rice) in the north-western Mountainous of Vietnam'. The author introduced background of research, methods and results for conservation of local maize and rice. The results demonstrated a diversity of race varieties of maize and rice in upland communities in North Vietnam. Genetic erosion was also evident due to application of new improved cultivars. The author found that a plenty of local genetic resources are still maintaining in remote hamlets, where transport is still very difficult.

Dr. Anan Polthanee, Khon Kaen University, Thailand, presented a paper on Strategies for Conservation of Plant Genetic Resources in Thailand. In the presentation, the author mentioned that the gene bank of Thailand is not enough for conservation of plant resources. Integrated genetic conservation and farming system play very important role for PGR. The role of medicinal man also is highlighted. The Ministry of Agriculture has provided a policy for collecting PGR having wild relatives. Main constraints are insufficient funds for the conservation of PGR. NGOs also are active in conservation of PGR. However, the Thai Farmers still not fully understand the role of Conservation of PGR, and they have only a little attention on conservation of PGR.

Dr. Nguyen Van Tap gave a poster presentation on conservation of medicinal plants in Vietnam. The potential and current status of medicinal plants in Vietnam was highlighted. Dr. Tap warned the urgent needs of conservation for medicinal plants. For high conservation efficiency of medicinal plants, *in situ*, *ex situ*, and on-farm conservation should be integrated. Conservation should be parallel with plantation on-farm for use and sale of medicinal plants.

#### **General comments during the discussion**

- *Ex situ* conservation requires high cost for maintaining genetic materials. Dr. Tung argued on the removal of plant genetic resources from their origin causing changes to their habitat.

- Based on the presentation and sharing experience among participants, *in situ* is the easy and efficiency way for PGR in the developing countries. Both country representatives agree on *in situ* conservation, which need to be improved as the first priorities. The Thailand case study recommended the functions of medicinal men and monks for *in situ* conservation.
- Integrated approaches and information system are support tools for *in situ* conservation.
- The governments have a great attention for publication of PGR works, and it is only slightly issue!
- GMO and synthetic biology are still not familiar with Southeast Asian Countries. Policy makers (Vietnam) do not want to investigate deeply on these issues.

#### In situ conservation

Vietnamese participants gave the first priorities for expanding *in situ* farms representing different ecological regions, while Thai participants considered facilities and funding supports are the most important (La Tuan Nghia, Lam, Long).

#### Integrated approach

Representatives from both countries agree on the issues of farmer participation in PGR, where *in situ* integrated with *ex situ* to reach the goal of conservation (Dr. Anan, Poramate, Lam, Liet, Sen, Tap).

#### Ex situ conservation

- *In vitro* (plant tissues) for conservation.
- Although Vietnam has not yet signed the ITPGRFA, some genetic resources are accepted for exchange by decree 79 and 80 issued by the government. Vietnamese authorities still worry about the loss of genetic resources or unequal exchange PGR with foreign countries. Thailand has got some benefits from the ITPGRFA and they have a huge collection of PGR in Bangkok. Some varieties and cultivars have been exchanged between Vietnam and Thailand (Mango, persimmon, pomelo, rice, peanut, guava, and banana).
- Vietnamese scientists consider data sharing and skills on *ex situ* PGR conservation are the first priorities since the network on PGR is still weak and overlapping implementation is still going. The Thai Scientist also considered it is important, but people should firstly understand the benefits from *ex situ* conservation. If farmers do not fully understand, PGR conservation hardly gets the success.

#### Dissemination

Both Vietnamese and Thai scientists recognized the limitation of dissemination of results to general public. There are only available PGR works in the special journals or specific publications. The need to disseminate PGR results in general public is the first priorities.

#### Biotechnology

Biotechnology is still a challenge for Vietnam due to limited staff, inadequate laboratories, small funds, and farmer's awareness. The situation in Thailand is much better. In the near future, Vietnam need more funds for investments on PGR biotechnology, but the priorities should be given to *in situ* conservation approaches by the simple way.

#### **Conclusions**

Based on the presentation and sharing experience among participants, *in situ* conservation is an easy and efficiency way for PGR in the developing countries. Both country representatives agree on *in situ* conservation, which need to be improved as the first priorities. The participants also agreed on the integrated approaches which combined both *in situ* and *ex situ* conservation:

- For *in situ* conservation, both countries agreed *policy and funds are needed in order to support local farmers, who cultivate wild species or local varieties*. The Vietnamese participants strongly recommended increasing the number of *in situ* conservation farm representing different ecological regions.
- For *ex situ* conservation, both country representatives agree on capacity building. Vietnamese participants considered that *ex situ* conservation skills are still major issues,

but the Thai scientists proposed that all stakeholders should understand the benefit from *ex situ* conservation. Consequently, training and on-job teaching are needed for capacity building.

- However, *ex situ* and *in situ* conservation still have their own constraints. Then, representatives from both countries agree on the issues of farmer participation in PGR, where *in situ* integrated with *ex situ* to reach the goal of conservation.
- The information system is better in Thailand than Vietnam. The Vietnamese scientists considered policy as an important factor, while the Thai considered funding as the first priority.
- Both Vietnamese and Thai scientists recognized the limitation of dissemination of results to general public.
- GMO and other issues are important, but capacity building for *in situ* conservation skills and facilities are extremely important for Southeast Asian Countries.

## 2.4 Discussion of outcomes of regional workshops, similarities and differences between regions

*Contributed by Shelagh Kell*

Issues raised during the discussion session included:

- *In situ* and *ex situ* conservation approaches should be seen as complementary, using different techniques in different circumstances, rather than as alternative approaches.
- *In situ* (on-farm) conservation of landraces will obviously not be efficient if farmers do not continue to grow them. There are various socio-economic reasons why they may not continue to grow landraces, as has been highlighted by research in Europe. The problem may be even more complex in China and Southeast Asia. The issue of how to persuade farmers to continue to grow them is shared by the regions. In some circumstances, *ex situ* conservation may be the most efficient approach to landrace conservation.
- Conservation of landraces through niche marketing is common to Europe, China and Asia. For example, in Nepal and Vietnam, defining commercial markets has been a major driving force for landrace conservation. In Nepal, a landrace of taro had almost disappeared, but after appropriate intervention, it gained a global market. Markets can however lead to homogenization; therefore, it is critical that the right type of intervention is made at the right time. For example, in China, buckwheat landraces are marketed individually for their use in different products. It was also noted that the economic power of niche markets is not always strong enough and that even with niche marketing in place, genetic erosion can still occur. Furthermore, while niche marketing can be quite successful, it is not a means of conserving a wide range of landraces; therefore, *ex situ* conservation is vital to conserve as broad a range of landraces as possible, while *in situ* conservation of as many as possible continues.
- In China, the value of crop wild relatives (CWR) is not recognized. Many wild rice populations are being eroded due to a lack of sustainable support for their conservation.
- Conservation of both landraces and CWR is important (not one or the other). CWR are particularly important for their role in crop improvement in response to climate change.

### 3.0 Towards an inter-regional dialogue

#### 3.1 Review of the European and Asian partners' lists of PGR issues

##### 3.1.1 Review of the European partners' list of PGR issues

*Contributed by Oz Barazani*

The first step in initializing a list of the European PGR issues was done by personal meetings between Markus Schmidt and members of the DIVERSEEDS group. A preliminary list of 43 issues was compiled and categorized to five main groups:

1. Task sharing through collaboration and capacity building;
2. Characterization, documentation and information for conservation;
3. Sustainable utilization (traits of agronomic importance);
4. *In situ* and on-farm conservation, integrated approach;
5. Others (e.g., climate change, awareness, legal issues).

In the first regional meeting, M. Schmidt introduced the two Asian PGR lists and suggested a methodology for prioritization of key issues. The participants were asked to score ten top priority issues and to rank each one of the 43 issues from 10 (being the most important) to 0 (being the least important). These were used to rank the PGR issues in different scoring categories. Table 1 presents the ten highest ranking issues in the European list, their ranking values, and the corresponding values in the Southeast Asian and Chinese lists.

**Table 1. The ten highest ranking issues in the European list of PGR issues, showing the corresponding values in the Southeast Asian and Chinese lists (– = not applicable)**

	Europe	Southeast Asia	China
<b>1.1</b> Task sharing and capacity building:			
Task sharing and capacity building	9.1	–	–
Technical assistance, scientific cooperation	7.1	–	–
<b>2.1</b> Documentation and information	8.8	–	9.0–9.5 (issues 1.1–1.2)
<b>2.2</b> Information system- <i>Ex situ</i> : lessons from AEGIS	7.7	–	–
<b>2.5</b> Modern methodologies to support PGR conservation	7.7	7.3 (issue 6.1)	8.5 (issue 1.5)
<b>3.1</b> Utilization- Enhanced utilization of conserved diversity	6.6	–	8.0–9.2 (issue 4)
<b>4.1</b> <i>In situ</i> and on-farm conservation	6.6	7.0–9.0 (issue 1)	9.75 (issue 3.1)
<b>5.1</b> Impact of climate change			
<b>5.1</b> PGR and climate change	6.9	–	8.0 (issue 5.3)
<i>In situ</i> and climate change	6.6		
<b>6.1</b> Training	9.7	7.8 (issue 5.2)	–

##### 3.1.2 Review of the Chinese partners' list of PGR issues

*Summarized from a presentation given by Zengyan Zhang*

The list of PGR issues identified by the Chinese partners can be classified in three main groups:

1. Scientific research
2. Policy
3. Others

Under scientific research, the issues are:

- *Ex situ* conservation
- *In situ* conservation
- On-farm conservation

- Evaluation
- Use

#### **Ex situ conservation**

The important issues identified were:

- Which strategy to collect PGR?
  - How many sites
  - How many populations per species
  - Whether pools or individuals per population?
  - How many seeds/plants per sample?
- How to set up efficient techniques and mechanisms for safe conservation?
- How to monitor the vigour of conserved PGR?
- How long and how to renew the conserved PGR?
- How to maintain genetic integrity of PGR?

#### **In situ conservation**

- How to monitor efficiency and dynamics of genetic diversity of *in situ* conservation?
- How to prevent destruction of habitat of wild PGR and loss of plant diversity from human activities and agricultural practices?

#### **On-farm conservation**

- How to survey on-farm conservation?
- How to integrate traditional knowledge and farmer incentive into strategies of conservation?
- How to develop farmers' techniques on conservation and management?

#### **Evaluation of PGR**

- How to standardize procedures to conduct detailed evaluation?
- How to identify traits of interest before utilization?
- What is the reciprocal relationship between the ecological evolutionary genomics and the conservation of PGR?

#### **Utilization of PGR**

- How to screen for genes of interest for breeding and environment improvement?
- How to ensure sustainable utilization of PGR?
- How to enhance germplasm?

#### **Policy**

- How to establish universal regulation on conservation and utilization of PGR?
- How to establish popular and public participation mechanisms?
- What strategy of access and benefit sharing?

#### **Others**

- How does domestication affect PGR?
- What is the effect of gene flow on PGR?
- Does global climate change affect PGR?

### **3.1.3 Review of the Vietnamese and Thai partners' list of PGR issues**

*Contributed by Poramate Banterng*

#### **The summary for list of important questions for PGR**

The list of important questions and current issues regarding to conservation and use of PGR was proposed by discussion between researchers, policy markers, NGOs and farmers in Thailand and Vietnam, and the detail of important question were summarized in to six categories.

#### Ex situ

- How can we know the certain plant species in other countries?
- How can we share the legal PGR with the other countries?
- What are the advantages and the constraints of *ex situ*?

#### In situ

- Is there sufficient information on morphology, physiology and DNA of PGR adapted on certain ecology?
- Who are important plant genetic resources experts for *in situ* conservation?
- What about climate change impact on *in situ* genetic diversification?
- How to increase the number of *in situ* conservation farm representing different ecological regions?
- Is there sufficient for *in situ* conservation of PGA in each region?
- What are the advantages and the constraints of *in situ*?
- How can stakeholders in Asian and European countries benefit from the ITPGRFA?
- What are the incentives for a farmer to keep landraces?
- Does the FAO ITPGRFA take *in situ* PGR and CWR into account?
- Should it take into account botanic garden/parks in schools, colleagues, universities as well as in cities, rural areas?
- Should it raise the habit of individual persons on the collection of PRG?
- How to improve FAO ITPGRFA procedures for evaluating plant species to adapt local conditions?
- What about the facilities and funding support for *in situ* conservation of PGR?
- Are existing *in situ* PGR reserves climate change proof? How can this be evaluated, and which strategies are available to make them climate change proof?
- How occurrence of new improved varieties change the way of PGR conservation at the farm level?

#### On-farm

- What are the incentives for NGOs and farmers to keep indigenous plant species?
- Is the role of home gardens and hut gardens sufficient for conservation of PGR?
- What is the role of integrated farming for PGR?
- How to utilize all PGR with farmers' participation in order to reduce cost of conservation and increasing effectiveness and diversification?

#### On-community

- How can the NGOs, farmers, local medicinal doctors and the monks in Asia contribute to the conservation of PGR?
- Is the role of community forest sufficient for conservation of PGR?
- How to increase the number of integrated farming as PGR conservation?

#### Dissemination

- What is the current status for PGR dissemination?
- How can current dissemination strategies be improved to reach scientists, NGOs, farmers and interested public?
- How to disseminate results of plant genetic conservation through education channel and general public?
- How to organize training on the skills of PGR conservation in the systematic way?
- How the skills on conservation of PGR should be transferred from scientists to farmers as well as from farmers to farmers.
- What are suitable measures for data sharing among all parties working on plant genetic resources?
- How to introduce the red book to the farmers? Then, what are benefits to the farmers?

#### Biotechnology

- What about the impact of biotechnology on genetic diversification and PGA?
- How could new developments in biotechnology, such as DNA synthesis change the way PGR conservation is practiced today?
- Will *in vitro* practices be used as alternative way for PGR conservation in the near future of Vietnam? If yes, how much does it cost?

#### **Constraint in survey and collection PGR**

- Insufficient investment
- Diverse and complex topography
- Survey and collection are still in in-systematic way, not in time, consequently many genetic race species disappeared
- Lacking of system fore card/provide early warning of genetic erosion

#### **Constraints for ex situ conservation**

- Cooling storage in poor condition
- Evaluation, description and identification still used simple techniques
- Field conditions (narrow areas)
- Repetition of genetic assessors
- Genetic erosion is still on-going inside the collection of *ex situ* conservation
- Not yet establish collection of core assessors
- Not yet long-term storage of PGR

#### **Constraints for in situ conservation**

- Policy for investment in conservation of PGR still not yet existed.
- National funds are still insufficient, only some project supported from foreigners.
- Lacking of policy support
- Limited number of farms
- Unsustainable, insufficient on-farm conservation leading to lost of local GR
- Local communities' participation is still limited.

#### **Constraints for documentation and dissemination of results**

- Application of informatics technology
- Full assessment of genetic resources
- Insufficient budget, maintaining, upgrade database of PGR at national level
- Poor facilities in informatics technology
- Difficulty in assessable information, data sharing leads to overlapping or less understanding of PGR in use

#### **Assessable constraints of exploring PGR for use**

- Insufficient information on PGR/gene bank (insufficient genetic evaluation)
- Lacking policy to support producers/conservers of PGR
- Lacking policy for support and control of seed quality for services/business
- Habit of the users

#### **General comments**

- *Ex situ* conservation requires high cost for maintaining genetic materials. Dr. Tung argued on the removal of plant genetic resources from their origin causing change their habitat.
- Based on the presentation and sharing experience among participants, *in situ* is the easy and efficiency way for PGR in the developing countries. Both country representatives agree on *in situ* conservation, which need to be improved as the first priorities. Thailand case study recommended the functions of medicinal man for *in situ* conservation.
- Integrated approaches and information system are support tools for *in situ* conservation.
- The governments have a great attention for publication of PGR works, and it is only slightly issue.

- GMO and other forms of biotechnology are still not familiar with Southeast Asian countries. Policy makers (Vietnam) do not want to investigate deeply on these issues.
- Vietnamese participants gave the first priorities for expanding *in situ* conservation on farms representing different ecological regions, while Thai participants considered facilities and funding support is the most important.
- Representatives from both countries agree on the issues of farmer participation in PGR, where *in situ* integrated with *ex situ* would be best to reach the goal of conservation.
- *In vitro* (plant tissues) for conservation.
- Although Vietnam has not yet signed the ITPGRFA, but partly genetic resources are accepted for exchange by decree 79 and 80 issued by the government. Vietnamese authorities still worry about the lost of genetic resources or unequal exchange PGR with foreigner countries. Thailand has got some benefits from the ITPGRFA and they have a huge collection of PGR in Bangkok. Some varieties and cultivars have been exchanged between Vietnam and Thailand (mango, persimmon, pomelo, rice, peanut, guava, and banana).
- Vietnamese scientists consider data sharing and skills on *ex situ* PGR conservation as the first priorities since the network on PGR is still weak and overlapping implementation is still going. The Thai Scientist also considered it is important, but people should first understand the benefits from *ex situ* conservation. If farmers do not fully understand, PGR conservation hardly gets the success.
- Both Vietnamese and Thai scientists recognized the limitation of dissemination of results to general public. There are only available PGR works in the special journals or specific publications. The need to disseminate PGR results in general public is the first priorities.
- Biotechnology is still a challenge for Vietnam due to limitations of staff, inadequate laboratories, small funds, and farmer's awareness. The situation in Thailand is much better. In the near future, Vietnam needs more funds for investments on PGR biotechnology, but the priorities should be given to *in situ* conservation approaches.

### 3.2 Criteria for selecting key issues for inter-regional dialogue

Given the wide variety of issues mentioned and rated in the bottom-up approach of the first twelve months of the project, there is a need to select some of these issues that best fit the requirement of starting or increasing an inter-regional dialogue between project partners and beyond. In order to select the most important issues, the meeting participants agreed on the following three main criteria:

- **Feasibility:** project partners should have the necessary expertise and competence.
- **Impact:** issues where we can make a real impact and that can be practically implemented.
- **Superposition:** Issues that are of interest for all three regions.

In addition, the following criteria could also be taken into account:

- **Collaboration:** other activities that are planned/ongoing and that could provide an opportunity to collaborate.

### 3.3 Preliminary selection of key issues for inter-regional dialogue

Participants discussed some of the issues that had been raised and ranked highly by the different regions. It was noted that when selecting key issues for inter-regional dialogue, it will be important to distinguish between the need for capacity building and how to tackle specific research questions. For example, for some of the highest ranking issues identified, detailed information on techniques is already available (e.g., how to sample for *ex situ* conservation). Documentation and information management is a key issue that needs further discussion. Some Southeast Asian countries have already established information sharing mechanisms, but European experience in this field could make a valuable contribution. It was agreed that the key issues would be selected during the breakout working group sessions.

## **4.0 ECPGR – DIVERSEEDS – Bioversity inter-regional session**

*Contributed by Shelagh Kell*

### **4.1 Introduction to and aims of the joint session**

During this session, the DIVERSEEDS meeting participants held a joint meeting with the members of the ECPGR Inter-Regional Cooperation Network (IRCN) and Bioversity. The IRCN is a relatively young network that has similar goals to the DIVERSEEDS project; however, it involves regional and sub-regional PGR networks from all over the world. Given that the IRCN will continue its work after the DIVERSEEDS project has finished at the end of 2008, this joint meeting was set up to help identify common goals and synergies between the two initiatives, to see whether future joint activities can be identified and to find out if the DIVERSEEDS project outcome could also contribute to the success of the IRCN.

### **4.2 Summary of the main outcomes of the Joint ECPGR – DIVERSEEDS – Bioversity Inter-Regional Workshop**

Immediately prior to the DIVERSEEDS First International Meeting, a joint workshop was held between the ECPGR IRCN and Bioversity, which was attended by the DIVERSEEDS Project Coordinator, Markus Schmidt, to represent the project. The ECPGR Secretary, Lorenzo Maggioni, explained that ECPGR and Bioversity aim to establish links with other networks in other regions with the objective of redefining the role of networks in the changing PGR arena; specifically, in the context of the ITPGRFA, FAO Global Plan of Action (GPA) and work of the Global Crop Diversity Trust (GCDDT). The main objectives of the different networks (Sub-Saharan Africa, Central Asia–Caucasus, rest of Asia, Americas and Europe) were discussed during the workshop and presentations on the international context were given by Toby Hodgkin, Jozef Turok, Lorenzo Maggioni and Gerald Moore (Bioversity), Jane Toll (GCDDT) and Eva Thörn (Swedish Biodiversity Centre). An executive summary of this workshop is appended to this report.

### **4.3 Introduction to DIVERSEEDS and presentation of preliminary list of selected key issues for inter-regional dialogue**

Markus Schmidt briefly introduced the DIVERSEEDS project for the benefit of participants at the joint session who were not already familiar with it. He also outlined the initial results of DIVERSEEDS partners' deliberations on important PGR issues at both intra- and inter-regional levels.

### **4.4 Roundtable discussion on inter-regional collaboration**

During this session, presentations were given by Jane Toll (GCDDT), Stefano Diulgheroff (FAO) and Toby Hodgkin (Bioversity), followed by questions and discussion. Jane Toll introduced the GCDDT and the Global System and outlined areas where regional networks can contribute and benefit. These include:

- Engaging countries/collection holders in developing conservation strategies;
- Coordinating development and implementation of a regional regeneration project;
- Organizing advice and training within the region on policy and technical issues;
- Monitoring the Global System to maximize benefits to region;
- Developing and implementing strategies/systems for non ITPGRFA Annex I crops of local or regional importance.

Stefano Diulgheroff outlined the role of PGRFA networks in the FAO Global System for the Conservation and Sustainable Use of PGRFA and GPA. He stressed the importance of regional and national PGRFA networks as instruments for GPA implementation; in particular, for germplasm exchange, information sharing and technology transfer. Toby Hodgkin introduced the System-wide Genetic Resources Programme (SGRP) of the CGIAR, which was founded in 1994 and explained that since 2006, the collections have been placed under the auspices of the ITPGRFA and more than 100,000 accessions have been distributed under ITPGRFA SMTAs. He noted that linkages between regional PGR networks and the SGRP are currently poor and that there is a need for capacity building and training, collaborative research and better utilization of the collections. The SGRP can provide this type of support for regional networks and can also advise on policy implementation (e.g., the ITPGRFA). He stressed that regional networks have an important role to play in assisting countries to implement the Treaty.

Issues discussed after the presentations included:

- Who will create the GCDT Global Accession System and using what technology? It will be led by Bioversity, building on SINGER/EURISCO. The project will have a Steering Group of experts and will aim to link existing crop databases.
- Is a standard approach being adopted for crop-based conservation strategies or does the approach differ depending on the taxon? The Trust has produced a set of guidelines reflecting what they want to see coming out of the strategies; however, each strategy differs, depending on the crop. The strategies will mainly deal with existing collections—there are no plans to undertake gap analysis. It was noted that some global and regional crop strategies are already available on the GCDT website.
- The FAO report on the State of the World's Plant Genetic Resources for Food and Agriculture will be updated in 2009 and will serve as the basis for the revised GPA.
- It was noted that to achieve strong regional networking, strong national networks are needed and that the definition of regions can be an issue. It is possible in some circumstances that geographic regions may be superseded by groups of countries sharing similar issues and objectives; for example, in the Americas, networks are organized around eco-regions.
- A key role of regional networks is to provide support at national level. The SGRP does not currently operate at national level for PGR conservation—is there an opportunity to change this? The CG centres have done a lot of training and capacity building, but more could be done in the area of collaborative research. The role of the CG gene banks has not historically had the visibility it has today. They are now playing a stronger and stronger role in conservation via the collections, including provision of support for *in situ* conservation.
- It was noted that regional networks may have an important role to play in linkages between *in situ* and *ex situ* conservation. However, it was argued that this is often talked about but never actually put into practice. There is a need for a holistic approach to gene pool conservation using complementary *in situ* and *ex situ* techniques. At present, there are many information systems focusing only on *ex situ* conservation. The linkage between these systems (and the organizations that manage them) and the *in situ* conservation community does not yet exist in any concrete form.

#### **4.5 Discussion of common ECPGR / DIVERSEEDS / Bioversity issues / opportunities for networking and collaboration**

Workshop participants agreed that the session had highlighted many opportunities for networking and collaboration between the regions and that the aims of the DIVERSEEDS project are concurrent with those of the ECPGR IRCN and Bioversity networks. The DIVERSEEDS partners agreed that the executive summary of the joint ECPGR/DIVERSEEDS/Bioversity Inter-regional Workshop on Crop Genetic Resources Networks provides a very accurate summary of the issues that have been raised and discussed during the DIVERSEEDS project.

## 5.0 Technical workshop

### 5.1 Introduction to and aims of the technical workshop

The objective of the technical workshop was to allow for some more detailed presentations and subsequent discussions on selected issues from Europe and Asia. The workshop consisted of four presentations followed by discussion on the issues raised:

- AEGIS: An example of using a network approach to rationalize conservation.
- Crop wild relatives: context and conservation strategies.
- Role of local people for *in situ* conservation of PGR in Vietnam and Thailand: lessons learned.
- Conservation biology and conservation of CWR in China.

Summaries of the presentations and issues discussed are presented below.

### 5.2 AEGIS: An example of using a network approach to rationalize conservation

*Contributed by Jan Engels and Lorenzo Maggioni*

#### **Introduction**

Worldwide approximately 1500 genebanks or germplasm collections have been reported by FAO to exist (FAO, 2005), a development that started not much earlier as the 1960s. These genebanks and collections contain an estimated six million accessions of which approximately two million are regarded as genetically unique. In Europe an estimated 500 genebanks or germplasm collections are reported by FAO which contain approximately two million accessions of which only 30–40% are assumed to be unique. The latter is not a surprise as most of the more than 40 European countries initiated the establishment of genebanks during the second half of last century, including the newly independent states, all looking after their own interests. Even membership in the European Union did not influence a regional community approach to conservation, which has remained largely an individual country responsibility up to the present.

In view of the above situation in Europe and as an effort to strive towards a more coordinated conservation effort of the European crop genetic resources, the International Board for Plant Genetic Resources (IBPGR) with the assistance of the United Nations Development Programme (UNDP) established in 1980 the European Cooperative Programme for Plant Genetic Resources (ECPGR). The Programme is Europe wide, deals with all the major crops or crop groups and many of the minor crops and has evolved since its inception into a strong, self-financed network that is being coordinated by a small Secretariat hosted by Bioversity International.

With respect to the conservation of plant genetic resources (PGR) activities in Europe a number of unsatisfactory conditions and/or difficulties with their maintenance were reported by the ECPGR Crop Working Groups, including the lack of long-term conservation facilities, insufficient safety-duplication as well as regeneration backlogs. It was apparent that through a more systematic sharing of conservation responsibilities the aforementioned and other shortcomings could be overcome and a discussion of options on sharing of responsibilities in Europe started already in 1998 (Gass and Begemann, 1999).

The above described situation led to a decision by the ECPGR Steering Committee, during its 9th Meeting in Izmir, Turkey in 2003 to initiate and fund a feasibility study on the establishment of an integrated European genebank system that would result in more effective and efficient conservation approaches in Europe at large. The feasibility study was conducted in the period mid 2004 – mid 2006, using four “model” crops that were carefully selected based on a number of criteria such as: Annex I or non-Annex I crop of the International Treaty; annual or perennial; seed or vegetatively propagated and/or conserved, in order to represent the total array of crops in Europe as well as possible. The crops chosen were *Avena*, *Allium*, *Brassica* and *Prunus*. It was further decided to establish an AEGIS Advisory Committee and a small Coordination Unit at Bioversity International. The objectives of the feasibility study that eventually should provide for the basis of the establishment of AEGIS, include the assessment of different approaches and propose models for the genebank system; a proposed organizational structure; to address legal/ political issues in developing the system; to analyze the concept of Most Appropriate Accession; and to draft guidelines on quality standards for long-term conservation.

**Summary of results obtained**

The feasibility study resulted in a number of outcomes that were discussed during the mid-term meeting of Phase VII by the Steering Committee in Riga, Lithuania. These results can be summarized as follows:

1. Broad agreement among partners to establish an efficient, well coordinated and rational European Collection. These and other key elements of the to-be-established integrated European genebank system have been summarized in the Strategic Framework document (Anonymous 2008).
2. The establishment and operation of AEGIS is being seen as an important contribution to the implementation of the International Treaty. Consequently, the provisions of the Treaty, including its agreed Standard Material Transfer Agreement (SMTA) are fully embraced in the aforementioned key elements and objectives of AEGIS and will provide the cornerstone of the system.
3. One of the most important steps towards the establishment of AEGIS will be clear and easily applicable criteria and procedures for the identification of the so-called Most Appropriate Accessions (MAAs) that will be used in deciding which accessions will eventually constitute the European Collection.
4. All the germplasm accessions that have been or will be included in the multilateral system of the Treaty will be in the public domain and made readily available to users as per the conditions agreed upon in the SMTA. Accordingly, the MAAs that will constitute the European Collection will be treated as public domain accessions and made readily available to its users.
5. Countries will accept long-term conservation responsibility for MAAs and make these available to the users in the partner countries. This means that AEGIS will operate as a virtual genebank based on formally agreed responsibilities, with well-coordinated activities. The national and institutional genebanks are the building blocks of the virtual genebank. The genebank operations (i.e. viability testing, regeneration, safety duplication, collecting, germplasm distribution/exchange, information management, and characterization/evaluation) will be conducted according to agreed quality standards and quality management system.
6. In addition to routine genebank operations and functions countries are also invited to provide other kind of conservation services to AEGIS, including fields and expertise for regeneration, information management capacity, crop breeding and research capacity, etc.
7. It has been agreed to formalize the aforementioned commitments through a Memorandum of Understanding that will be concluded with all the AEGIS partners, both countries as well as collaborative institutions.
8. Whenever possible, existing ECPGR bodies will be involved in the planning, implementation and oversight of AEGIS, including the ECPGR Steering Committee (together with the AEGIS Advisory Committee to provide oversight), the coordination (by the Crop Working Groups) and implementation of activities (i.e. the National Coordinators). The existing European Information Search Catalogue (EURISCO) and the Central Crop Databases (CCDBs) play a critical role in the establishment and operation of the European Collection.
9. The ECPGR Steering Committee requested the ECPGR Secretariat to coordinate the development process of AEGIS.
10. During its mid-term meeting the ECPGR Steering Committee agreed to continue the AEGIS development process after the conclusion of the feasibility study as an integral ECPGR Programme element.

**Concept of Most Appropriate Accession (MAA)**

As already mentioned, the selection of the MAAs is a critically important step in the establishment of the European Collection. The process consists of the identification of those accessions that comply with the selection criteria that have been agreed upon by each of the Crop Working Groups (CWGs) for each of the crop gene pools that are being maintained collectively by the European countries. The selection criteria can be divided into primary and secondary criteria, as follows:

Primary criteria:

- A. Fully discriminative, i.e. accepted accessions will need to comply with all selection requirements listed below.
  - B. The primary criteria are not crop-specific.
1. Accessions in public domain (i.e. Annex I material that is in the MLS and non-Annex I material designated to AEGIS by governments or any other holder);

2. Genetically unique (i.e. genetically distinct accessions; assessment based on available data and/or on the recorded history of the accession);
3. Agronomic (incl. research material) and/or historically/ culturally important;
4. Plant genetic resources, including medicinal and ornamental species as well as CWR, thus excluding forest genetic resources, non-plant agrobiodiversity species and others;
5. European origin or introduced germplasm that is of actual or potential (breeding/research) importance to Europe.

Secondary criteria:

- A. Not fully discriminative;
- B. The criteria might be crop-specific;
- C. These criteria are used when deciding which accession to accept among two or more “quasi duplicate” or similar accessions;
- D. The CWGs should decide if any of the above criteria should have prevalence over the others, or that the selection should be the result of a combination of two or more of the above secondary criteria.

1. Accession maintained in its “country of origin”;
2. Of a known origin (i.e. where collected and/or bred; pedigree data);
3. Comprehensiveness of passport information;
4. Number of regeneration/multiplication cycles;
5. Health status (i.e. germplasm to be disease free);
6. Existence of morphological/molecular characterization data;
7. Existence of (agronomical) evaluation data;
8. Validated accession name (particularly relevant for perennial clonal crops where the same name can be attributed to different accessions; history of individual accessions is important; special attention to be paid to synonyms and homonyms);
9. Others?

**Genebank quality system**

The ECPGR Steering Committee made an implicit decision when discussing AEGIS to develop a quality genebank management system. General aspects of such a quality system include:

1. A focus on genebank operational (e.g. seed storage, regeneration protocols, etc) and not on product related aspects (e.g. quality of composition of collection, information supply);
2. Quality assurance is based on the principle that:
  - a) you say what you do;
  - b) you do what you say; and
  - c) you let an independent body check that you do what you say (i.e. an audit);
3. Each genebank should write down its current procedures.

The above principles provide a good basis for developing technical standards and a good feedback mechanism aimed at improving quality!

**Perceived benefits of AEGIS**

A number of immediate and future benefits that the implementation of AEGIS will generate have been identified and they provide the basis for an active participation of the European countries and institutions in rationalizing their collective conservation activities. These include:

- Cost efficient conservation activities;
- Reduced unnecessary duplication of germplasm material;
- Improved quality standards;
- Increased effectiveness in regeneration;
- Facilitated access and availability of germplasm;
- Improved security of germplasm through safety-duplication;
- Improved sharing of knowledge and information.

**How will AEGIS contribute to the rationalization of collections?**

As rationalization of the European collections is the overriding motive for the establishment of AEGIS it is important to consider the reasons and aspects that AEGIS can contribute to enable such a rationalization process. The main considerations are:

- Building trust and confidence among partners;

- Agreeing on a transparent collaboration process;
- Accepting responsibilities on behalf of a network;
- Being prepared to share “own” achievements, infrastructure, expertise etc. with others;
- Demonstrating that the agreed approach of establishing a virtual collection works;
- Demonstrating that sharing of responsibilities leads to more efficient activities and synergies;
- Demonstrating that delegating activities and or germplasm conservation does not result in a “loss” but leads to possibly better and more effective conservation and use.

### **Conclusions**

It is apparent that the establishment of a rational and properly integrated genebank system in a regional context, such as Europe, can only be achieved with strong and properly coordinated national plant genetic resources programmes. Furthermore, a regional functional genetic resources programme or network with a well-defined and transparent coordination effort is a prerequisite for the formulation, planning, implementation and operation of such a genebank system. A strong regional supervisory body, with adequate authority, budgetary power and sufficient continuity in order to allow a natural “ripening” process to take place of forming an efficient and effective system are key conditions that need to be fulfilled first in order to proceed.

### **Discussion points**

- The question of how AEGIS will overcome ineffective links between conservation and use was raised. It was noted that the scope of AEGIS involves stakeholders; therefore, it should be the stakeholders (users) that define the collections.
- CWR are not currently systematically built into the AEGIS model.

## **5.3 Crop wild relatives: context and conservation strategies**

*Contributed by Nigel Maxted, Shelagh Kell and Brian Ford-Lloyd*

### **Introduction**

Crop wild relatives (CWR) are species closely related to crops (including crop progenitors) and are defined by their potential ability to contribute beneficial traits to crops; such as pest or disease resistance, yield improvement or stability (Maxted *et al.*, 2006). CWR are a critical component of plant genetic resources for food and agriculture (PGRFA) and are therefore vital for future food security; yet, in the past they have received relatively little systematic conservation attention. They are wild species of explicit utilization value that are increasingly threatened with extinction (along with all other wild plant species), but it is their potential utilization value that makes them a global, regional and national conservation priority. There are no current estimates for the precise use value of CWR diversity, but Prescott-Allen and Prescott-Allen (1986) estimated that the economic value of the use of CWR in the US was US\$340 million a year. The current global figure for specific CWR use is unknown, but individual examples such as the use of *Lycopersicon chmielewskii* in sweetening tomatoes, which has a value of US \$ 5–8m per year (Iltis, 1988), and use of various CWR to provide disease resistance to wheat, which has a value of US \$ 50m per year (Witt, 1985), illustrate the economic value of these wild species.

The gross global number of crop and CWR species is estimated to be 216,000 species, which is 80% of the world's 270,000 known flowering plant species (Maxted and Kell, 2008). However, this estimate employs a very broad definition of a CWR based on all species included in the same genus as a plant of socio-economic value. If the scope is restricted to the 77 global major and minor food crop genera, then the total number is 10,739 species. Of these, 1200 are primary and secondary wild relatives; therefore, these species are an immediate priority for global CWR conservation action. (Maxted and Kell, 2008)

### **Approaches to the establishment of CWR conservation strategies**

There are two primary techniques used for CWR conservation: *in situ*, primarily in natural habitats managed as genetic reserves and *ex situ* as seed in gene banks. Historically, CWR conservation has focused almost entirely on *ex situ* collection and storage, but it can be argued that *in situ* conservation is more appropriate because the genetic diversity inherent in and between wild CWR populations is constantly changing in response to their environment; therefore, CWR populations are a component of natural ecosystems that cannot effectively just be maintained *ex situ* (Maxted *et al.*, 2008a). Further it can be argued that when establishing

genetic reserves it is efficient that they are located in existing protected areas because: a) these sites already have an associated long-term conservation ethos and are less prone to hasty management changes associated with private land or roadsides, where conservation value and sustainability is not a consideration, b) it is relatively easy to amend the existing site management plan to facilitate genetic conservation of CWR species, and c) creating novel conservation sites can be avoided, thus evading the possibly prohibitive cost of acquiring previously non-conservation managed land (Maxted *et al.*, 2008b). However, it must be stressed that there remain few complete examples of the *in situ* conservation of CWR that can act as models for other crop gene pools.

There are numerous potential approaches to achieving the systematic conservation of global CWR diversity, but three distinct approaches may be characterized as the individual, national and global approach (Maxted *et al.*, in prep.).

#### ***The individual approach to in situ CWR conservation***

The individual approach is when a particular protected area (PA) who manages a PA that is not included in a national or global network wishes to raise the profile of the site by paying particular attention to the CWR species and advertising their presence to the potential user communities. This adds an additional dimension to the public attraction and conservation significance of the PA, so strengthening the budget justification for the site. To ensure CWR are adequately conserved at the site the management plan may need to be amended to facilitate the maximization of the genetic diversity of the target CWR species found within the site. This will involve demographic and genetic monitoring of the target populations, but the additional input should be balanced by the extra conservation value added to the site by prioritizing CWR conservation.

#### ***The national approach to in situ CWR conservation***

The national approach focuses on national priorities within a political country and results in the systematic conservation of CWR diversity in a national *in situ* network of genetic reserves, with backup samples held *ex situ*, primarily in the national gene banks. The national approach may also be thought of as the floristic approach, since priorities are established for a range of crop groups, rather than targeted at specific crop gene complexes. A schema demonstrating how a National CWR Conservation Strategy might be developed was presented and illustrated with examples taken from the recently published UK National Strategy; the methodology has also been applied for Portugal (Magos Brehm *et al.*, 2008) and Ireland (Fitzgerald *et al.*, submitted), and is soon to be applied for Pakistan. For the UK example, to conserve two thirds of the total priority 226 CWR taxa, 17 existing PAs were required to form the UK CWR genetic reserve network and thus provide systematic *in situ* conservation of UK CWR diversity (Maxted *et al.*, 2007). This approach might be taken by individual DIVERSEEDS country representatives.

#### ***The global approach to in situ CWR conservation***

The global approach considers worldwide priority crop gene pools and CWR diversity is conserved systematically via a global *in situ* network of genetic reserves, with *ex situ* backup in national and international collections. Priorities for the global approach are established and applied worldwide, irrespective of political boundaries and are likely to mean that genetic reserves are primarily established in scientifically selected sites, possibly associated with Vavilov 'centres of diversity', rather than spread more evenly across the globe—this is simply the result of the uneven distribution of crop diversity around the world. The global approach may also be thought of as the monographic approach because specific target crop groups are selected and conservation priorities may be established based on a range of criteria, including the degree of relatedness of each CWR taxon to the crop, geographic range, ecogeographic distinctiveness, levels of threat, distribution of genetic diversity and hotspot analysis.

Each of the three approaches outlined aims to incorporate CWR conservation within existing protected areas where possible, which involves the amendment of existing management plans and results in CWR diversity being actively conserved within the PA. The individual, national and global approaches should not be seen as alternative approaches but rather as a holistic approach to conserving overall CWR diversity. To illustrate the global approach, the example of cowpea and its wild relatives (*Vigna Savi*) in Africa was presented (see Maxted *et al.*, 2004). The application of the global approach involves a variation on genetic gap analysis, which

entails a comparison of natural *in situ* diversity with conserved diversity to identify where best to locate *in situ* genetic reserves. There are 61 species and 63 sub-specific African *Vigna* taxa. Three hotspots of *Vigna* diversity were found: around the Great Lakes, at the southern tip of Lake Tanganyika and in the Cameroon Highlands. Models that predict species richness highlighted other potentially important areas that are under-sampled in the Democratic Republic of Congo, south of Lake Victoria in Tanzania, and central Togo. Based on an analysis of complementary areas, three grid cells were found to contain 37 species. As a result, it was suggested that genetic reserves are established within existing protected areas at the southern tip of Lake Tanganyika, the coastal area of Sierra Leone and between Lake Victoria and the other Great Lakes. This is the approach that might be taken by the DIVERSEEDS partners as a whole to conserve CWR diversity of global importance, but with a focus on priority crop gene pools in the Chinese, Southeast Asian, Southwest Asian and European subregions of DIVERSEEDS.

### **Conclusion**

CWR may hold the vital traits that plant breeders require to develop new varieties that can maintain food production in times of climate change and ecosystem instability. As such, they constitute an important socio-economic resource while at the same time being a component of all natural ecosystems. They are currently threatened by the unsustainable human mismanagement of the environment, yet they are the group of wild species that can most obviously contribute to the Millennium goal of combining conservation with poverty alleviation. To effectively conserve CWR diversity for actual and potential utilization there is a need for comprehensive and systematic conservation strategies. Three approaches to systematic conservation have been identified (Individual, National and Global) but it is important that these are not seen as alternatives, they should be viewed holistically—the three actions need to be combined to provide the most effective conservation. The establishment of National and Global CWR Networks of *in situ* genetic reserves was highlighted as a target in the *Global Strategy for Crop Wild Relative Conservation and Use*, debated and agreed by 160 CWR specialists from 45 countries at the First International Conference on CWR Conservation and Use in Agrigento, Sicily, in September 2005. As a practical step towards achieving the *Global Strategy* goal, DIVERSEEDS partners have agreed to prepare a research project proposal focusing on the systematic *in situ* conservation of CWR and landrace diversity in the Chinese, Southeast Asian and European subregions of DIVERSEEDS.

## **5.4 Role of local people for *in situ* conservation of PGR in Vietnam and Thailand: lessons learned**

*Contributed by Nguyen Thanh Lam, Poramate Banterng and Tran Dinh Long*

### **Introduction**

In agriculture, the widespread adoption of a few improved varieties has narrowed the genetic base of important food crops and led to the disappearance of hundreds of landraces. Conserving and using plant genetic diversity is vital in meeting the world's future development needs and biodiversity conservation for saving our lives. Given the importance of genetic resources for food safety, and the fact that centres of origin are mainly located in developing countries, we are convinced that it is absolutely necessary to link European researchers with scientists from these world regions that otherwise do have little or no resources to exchange their research results. Therefore our project is aimed to open European research networks to Asian research colleagues (working in centres of origin), establish a communication platform, and to promote knowledge exchange on genetic resources and their management (see [www.diverseeds.eu](http://www.diverseeds.eu)).

Under the frame of the DIVERSEEDS project, a regional workshop on plant genetic resources issues in Southeast Asian countries was held at Hanoi University of Agriculture on 28 September 2007. The aim of the workshop was to share experiences and to recommend suitable strategies for PGR conservation. This paper discussed the role of local people for *in situ* conservation of PGR in Vietnam and Thailand. This information is a part of the workshop output.

### **Role of *in situ* conservation**

*In situ* conservation plays a very important role for conservation of plant genetic resources

(PGR) in the Southeast Asian Countries. The workshop participants summarized a number of advantages of *in situ* conservation as follows:

- Diversity of PGR is maintained in natural condition as well as maintaining crop evolution;
- Farmer management of PGR is highly encouraged;
- Increase income generation for farmers;
- Integrated farmers with benefit from PGR *in situ* conservation;
- Formulate link between conservation and use of PGR;
- To ensure on-going development of ecosystem.

Furthermore, potential and constraints of *in situ* and *ex situ* PGR conservation were discussed (Table 2). Both conservation methods have advantages and disadvantages (Long, 1995).

**Table 2. Potential and constraints of *in situ* and *ex situ* PGR conservation**

Conservation method	Potential	Constraints
<i>Ex situ</i>	<ul style="list-style-type: none"> <li>• PGR with oriented conservation, clear objectives, active actions</li> <li>• Easy exploitation and use (quickly get PGR for specific purposes)</li> </ul>	<ul style="list-style-type: none"> <li>• Not ensure to develop under original condition of growth that lead to change in genetic character</li> <li>• High cost for maintaining PGR (storage facilities...)</li> </ul>
<i>In situ</i>	<ul style="list-style-type: none"> <li>• Ensure the conservation under original condition, ensure crop evolution</li> <li>• Encourage farmer participation in PGR conservation</li> </ul>	<ul style="list-style-type: none"> <li>• Conservation area has to be large enough in order to maintain population of selected PGR in order to maintaining crop evolution and living condition</li> <li>• Suffering great impact from human intervention, market, policy and community awareness</li> </ul>

### **Issues in PGR conservation**

Based on experience in implementing several projects in Vietnam and Thailand, major issues in PGR conservation were highlighted as follows:

- For *in situ* conservation, selection of participating households was still influenced from outsiders or leaders of the communities. This situations lead to stop conservation activities when projects have gone or the farmers did not want to continue PGR conservation anymore (Ninh, 2007).
- Local authority did not really participate in PGR conservation. They are too busy and less interested in PGR conservation.
- Natural conditions sometime are still not suitable for PGR conservation as Global climate change has influenced.
- Most project officers are outsiders and living far away from conservation areas. In results, they have a little time stay with the communities.
- Several new exotic species (improved cultivars) have not yet adapted to local conditions.
- Most farmers are more economic oriented as they easy apply high value crops (improved cultivars) and ignore local varieties which are low economic value. This causes genetic erosion due to invasion from exotic plant species.
- Most local farmers are still strongly dependent on subsidy from the government and they are waiting for funding from the government. Some become very passive in PGR conservation.
- Existing PGR activities have not yet strongly linked and cooperated among scientists, local authorities, farmers, and business men. In results, these activities have got less supports from all stakeholders.
- Small scale farmers have not enough capacity for carrying PGR conservation in the long-extended period. Therefore, they need financial support from the government.

- Local policy and strategies were oriented for development rather than conservation.
- Land use policies are still insufficient to meet the demand from farmers.

### **Local people**

Each group of local people display their own functions in the community.

- Local farmers – producers versus maintaining plant genetic resources,
- Monks – Gardening & Training to local people & customary regulations,
- Local medicinal man/woman: maintaining and know the functions of medicinal plants.
- Local authority (Headman) has responsibility for land use planning, administration, and monitoring activities.
- Schools teachers can participate in PGR conservation process by establishing demonstration botanic garden for pupils, who will transfer knowledge and awareness to their parents.

### **Lesson learned: strategies for successful projects**

- Gene banks are not sufficient for conservation of plant genetic resources. The strategy should be to increase the number of gene banks where the diversity is located in each province.
- Integrated farming systems play an important role in plant genetic conservation. The strategy is increasing the number of integrated farming practiced by the farmers.
- Farmers do not know the important usefulness of particular crop/variety in their community, so they ignore for conservation. The strategy is to give information to the farmers about the important use of particular crops in the community, and then to organize farmer groups to use them for economic purposes. So, they have to conserve genetic resources conservation.
- The Department of Agriculture, Ministry of Agriculture, offers a policy for collecting traditional crop/variety and scientific study for utilization, but provides limited funding. The strategy is to increase the budget for survey and study in terms of scientific utilization to make PGR of greater valuable.
- NGO activities play an important role in plant genetic conservation. They search for traditional crop/variety in a particular community, as well as study crop utilization. If they find a good crop/variety, this may be very useful for the community. However, this activity is still limited in term of implementation. (Polthanee, 2007)

### **Recommendation for conservation strategies of PGR**

#### Farmer's participation

- Encouraging local people to participate in the PGR conservation process, both *in situ* and *ex situ*, will increase their knowledge and understanding.
- Biodiversity is locally maintained in farmers' fields and their crops are passed down from generation to generation. Cultural, economic, and social factors are influential on farmers' decision making regarding collection and maintaining local cultivars. Farmers should be central during conservation of PGR, and farmer's participation is very important for success. TOT training should be organized for farmers to better understand the roles of PGR conservation and the disadvantages of genetic erosion. PGR conservation should be based on traditional practices, improving marketing channels, and the promotion of policy for encouraging farmers' participation in the conservation of PGR. The project should select potential farmers, who are willing to work and spend their time for *in situ* conservation.
- Project objectives should be relevant to community planning and their livelihood.
- Farmer awareness on biodiversity, its exploitation and sustainable use.
- Selection of qualified farmers, who are willing to participate and develop the required skills for PGR conservation.
- Alignment & Harmonization: Encourage farmer participation from project designer, planning and implementation, monitoring and disseminated results.

### Approaches

- Application of participatory approaches (PRA) to evaluate local PGR, farming systems for better understanding and raising awareness of their PGR values.
- Conservation should be integrated with traditional practices, to overcome marketing issues, to improve income generation, to promote farmer participation in PGR.

### Dissemination

- Distributed papers on PGR information and research results
- Demonstration of collection on PGR.
- To organize Workshop, Farmer field schools, food festival and demonstration of conservation species
- Meeting and introduction of conservation and biodiversity
- Field visit and exchange information in PGR.
- To raise public awareness through social activities, communication, training on genetic erosion, lost of biodiversity, the impact of climate change, and local valuable species (Nguyen *et al.*, 2006).

### **Conclusions**

A number of issues for conservation of plant genetic resources have been discussed mainly for farmer participation, the linked among all stakeholders, genetic erosion, more market oriented than PGR conservation, small scale farmers. In order to address these issues, lesson learned strategies for successfully project have been discussed. We realized that local people play a very important role for *in situ* conservation in Vietnam and Thailand.

For successful *in situ* conservation of PGR, the relationship and functions among different group of local people (Monks, interest group, medicinal men, and local authorities) should be understood. Finally, recommendations for conservation strategies of Plant Genetic Resources suggested that farmers should be in the centre of conservation programs, integrated conservation (*in situ* should be integrated with *ex situ*) as well as diversity of disseminations methods to raise public awareness.

## **5.5 Conservation biology in China and biodiversity studies at IBCAS**

*Contributed by Song Ge*

Biodiversity is the biological wealth of this planet and is fundamental to every culture and civilization. It contributes directly to the world economy in many, largely unseen, ways. However, in the effort to conserve the world's biodiversity, scientists have been faced with many challenging and difficult problems including (1) little is known about the overall biology of any individual plant species, (2) the urgency to take immediate measures in contradiction with the limited funding and time, as well as (3) contrary points of view in the conservation study and management such as the relative importance of genetic and ecological or demographic approaches in conservation efforts. Conservation biology is the application of biological theory and techniques to preserve species as dynamic entities capable of coping with environmental change. In this report, I summarized a few of the important characteristics of Chinese plant biodiversity and its significance. Then I briefly introduced some researches and conservation activities undertaken by the Institute of Botany of the Chinese Academy of Sciences (IBCAS), as examples of what have been achieved during recent decades in China.

China is very diverse both in climate and in topography that enable China becoming one of the richest countries in terms of the species number and floristic distinctiveness. The reasons of the rich flora in China consist of the ancient origin of many plant lineages, unique plate tectonics and limited impact of Quaternary glaciations. Of the world's estimated 250,000 vascular plants, some 30,000 (12%) occur in China. However, the diverse flora in China is facing a severe crisis due to the explosion of human population and rapid economic growth. For example, during the last several decades the rate of deforestation in China has been much higher than 1%, the world's average. In addition, reckless digging and collecting and non-controlled export of wild flowers and medicinal plants have also caused severe destruction of plant resources. Given the fact that 10% of plant species in the world are endangered, it is rather certain that the proportion of endangered plants in China is higher than 10%, and is estimated to be 15–20%. In addition, a considerable number of plant species (about 200) in China have been extinct during recent decades. Therefore, biodiversity conservation in China is recognized as an important task not

only in China, but also by the international community. Currently, we have known that the major factors that threaten plant biodiversity in China include habitat destruction, environmental contamination, over-exploitation, and biological invasion, among others. Although much work has been done on the legislation and planning, we are still faced with many challenges of establishing and improving conservation systems and facilities. Much practical management such as *in situ* conservation (natural reserves, natural parks, scenic spots) and *ex situ* conservation (botanical garden, seed banks, etc.) need to be strengthened. In addition, it is an urgent task for Chinese scientists to make a general survey on the endangered plants, to study their biological characteristics, and to work out scientific measures to conserve them before they go to extinction.

**Discussion points**

- It was noted that the genetic diversity in cultivated rice is very narrow and that there is still a lot of potential for improvement from CWR. *Oryza rufipogon* is the most closely related species and is important for cold tolerance. CAS research into wild rice has informed the government of its importance and a protected area has been established for the conservation of *O. rufipogon*.
- What are the greatest threats to *O. rufipogon* and is one protected area enough for its conservation *in situ*? The greatest threat to *O. rufipogon* is agriculture, second to urbanization and economic growth. In each province, local government have established protected areas; however, these are not legally protected. A policy is needed on the management of the sites across the whole country.
- The Flora of China has been digitized and the Chinese Virtual Herbarium should be translated in the next few years.

## 6.0 Towards inter-regional cooperation on priority issues

### 6.1 Background

The prioritization and definition of next steps for key PGR issues took place via three breakout working groups. These groups ensured a more efficient working environment and also took into account the different personal expertise of participants. The three groups focused on the following topics:

- *In situ* conservation
- *Ex situ* conservation
- Utilization and policy

The working group were organized so that they included at least two representatives from each region. These groups will continue to work together after the First International Meeting. Summaries of the results of the working group discussions are presented below.

### 6.2 Group 1: *In situ* conservation

*Contributed by Nigel Maxted and Shelagh Kell*

#### **Participants**

Poramate Banterng, Song Ge, Christoph Germeier, Lyda Hok, Shelagh Kell, Korous Khoshtakht, Nigel Maxted, Ngyuen Thanh Lam, Haifei Zhou

#### **Selection of key issues**

Category	Key issues
Research questions	<ul style="list-style-type: none"> <li>• Preparation of CWR and landrace (LR) inventories</li> <li>• Conservation/use:               <ul style="list-style-type: none"> <li>– Predictive characterization (including adaptation)</li> <li>– Gene flow between conserved resource and external factors (e.g., GMOs)</li> </ul> </li> </ul>
Capacity building/training	<ul style="list-style-type: none"> <li>• Identification of hotspots of CWR and LR diversity, including gap analysis</li> <li>• Management and monitoring techniques for CWR and LR diversity in protected areas and on-farm systems, including linking PGR and ecosystem communities, conserved germplasm to user communities</li> </ul>
Information documentation	<ul style="list-style-type: none"> <li>• Identification of existing <i>in situ</i> conservation information sources, systems and networks</li> <li>• Agreement for sharing concepts (ontologies)</li> <li>• Promotion of language independence or translation facility</li> </ul>
Dissemination/awareness	<ul style="list-style-type: none"> <li>• Raising awareness and inter-sectorial collaboration among PGRFA and other stakeholder communities (ecosystem protected area community, farmers, general public) of the importance of CWR and LR diversity</li> <li>• Making stakeholder communities aware of legal issues</li> </ul>

#### **Next steps**

The group decided that the best way forward would be to produce a concept note to form the basis of a funding application. The aim of the project would be to develop and implement methodologies for the systematic *in situ* conservation of crop wild relative diversity in China, Southeast Asia, Iran and Europe as a means of promoting food security in a time of ecosystem instability. Funding will be sought from appropriate EU and Chinese sources. Nigel Maxted agreed to draft a concept note for circulation in January 2008.

### 6.3 Group 2: *Ex situ* conservation

Contributed by Oz Barazani and Jan Engels

#### **Participants**

Oz Barazani, Jan Engels, Rivka Hadas, Yinghui Li, Chutima Ratanasatien, Long Trandinh

#### **Selection of key issues**

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Category	Key issues
Research questions	<ul style="list-style-type: none"><li>• How to build up a genebank core collection?</li><li>• How to optimize conservation strategies considering an entire genepool - when does <i>ex situ</i> conservation come into practice to compensate for <i>in situ</i> and on-farm conservation?</li></ul>
Capacity building/ training	<ul style="list-style-type: none"><li>• Development and application of common methodology to build up national inventories.</li><li>• Student and staff exchange programs between genebanks</li></ul>
Information documentation	<ul style="list-style-type: none"><li>• To establish national mandate to facilitate national inventories</li><li>• Get ministries and institutions concerned collaborating on PGRFA activities</li></ul>
Dissemination/ awareness	<ul style="list-style-type: none"><li>• Raising public awareness on issues related to loss of biodiversity, importance of conservation etc., through education at high school and university level and organize activities in schools and community centres</li></ul>

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#### **Next Steps**

It was suggested that issues which are of common interest would be the appropriate way to establish firm understanding and working relations among the participating members. For this purpose we suggest to focus first on how to establish mandate to facilitate national inventories:

#### Tasks

- Identify institutes/stakeholders responsible for PGR/FA in each country/region
- Decide on the procedures of establishing and managing a national (decentralized) documentation system that facilitates the creation and updating of a national inventory

#### Challenges

- Actual establishment of a common documentation system and of procedures and responsibilities of conducting the inventory

#### Funding opportunities

- Future EC-FP7 calls (identify appropriate theme and coordinate proposal development).
- FAO (as part of the State of the World report II process; TCPs? others?)
- Other?

#### Important players

- National PGR/FA committee of all key stakeholders (if not existing its establishment might be critically important), in particular of *ex situ* holders and *in situ* conservation site managers.
- It has been suggested that workshops would be the best platform to promote our ideas and to open discussions among regional/international committee(s) and stakeholders.

#### Public awareness

- To establish education programs.

Responsible leaders

- China: Yinghui Li
- Europe: Rivka Hadas
- SE Asia: Chutima Ratanasatien

**6.4 Group 3: Utilization and policy**

*Contributed by Markus Schmidt and Brian Ford-Lloyd*

***Participants***

Brian Ford-Lloyd, Veronika Hager, Angela Meyer, Aung Naing Oo, Percy Sajise, Markus Schmidt, Eva Thorn, Wei Wei, Zengyan Zhang

***Selection of key issues***

<b>Category</b>	<b>Key issues</b>
Research questions	<ul style="list-style-type: none"> <li>• What 6 neglected and under-utilized species (NUC) are of greatest interest across the three regions? (common?)</li> <li>• What are the options for them? (market constraints, their value, how can that be improved)</li> </ul>
Capacity building/ training	<ul style="list-style-type: none"> <li>• Treaty: <ul style="list-style-type: none"> <li>– Assessment of requirements and problems national bodies might face moving towards signing or ratifying the Treaty.</li> <li>– Provide training where required</li> </ul> </li> <li>• 6 NUC: derive model tools</li> </ul>
Information documentation	<ul style="list-style-type: none"> <li>• 6 NUC: Inventory in existing collections including evaluation data. Provide available information (incl. market value) update where necessary, distribute information</li> </ul>
Dissemination/ awareness	<ul style="list-style-type: none"> <li>• 6 NUC: increasing awareness (incl. its utilization)</li> <li>• Making NGOs, scientists, aware of the Treaty</li> </ul>

***Next steps***Tasks

- Decide the criteria for selecting neglected and underutilized crops (NUCs) that are very important for inter-regional dialogue.
- Contact people working with NUCs regarding the criteria. Ask the contactor in the region what are the priority NUCs.
- Methodologies: searching a model for finding NUCs.
- Search the NUC by region and have a short-list for each region.
- Check a report on NUCs that was just finished and submitted to FAO that only deals with food crops.
- Quickly find the crops and prepare the proposal.

Challenges

- In Myanmar, the database can not be accessed by internet.
- Information system: gene bank accession database in region?
- The existing information system in Birmingham University (the Crop Wild Relative Information System, CWRIS) could start to be used to enter data for the six chosen NUCs and then be used to enter data for other NUCs that may be crops or their CWR.
- Which crops? Food crop, non-food crop, bio fuel crop (*this could be our priority?-WW*)

#### Funding opportunities

- A joint fund will be approved between Bioversity International and FAO. We can try to be involved.
- A project in Bioversity itself is dealing with NUC, we can link to that.
- Strengthen other projects (*in situ*, *ex situ*) by involving, or develop NUC itself project.
- Future EC-FP7 calls on NUC.
- Other?

#### Important players

These institutions could maybe also provide fund opportunities:

- ICUC: International Centre of Underutilized Crops
- GFU: Global Facilitation Unit for Underutilized Crops
- A regional centre in China, centre of underutilized crops (?)
- National non-food crop centre in UK
- FAO (?)

It has been announced recently in the ICUC-News #59<sup>1</sup> that the ICUC–GFU merger task force takes up its work, which means that soon the two institutions will merge together into one.

#### Public awareness

- NUC: Use the current platform? Connect with the public awareness office in Bioversity International. Include NUC in DIVERSEEDS documentary film.
- Treaty: Public awareness, language translation. Correcting current translation. Including the treaty in the film of DIVERSEEDS?

#### Responsible leaders

- China: Wei Wei
- Europe: Brian Ford-Lloyd
- SE Asia: to be announced

#### Project output and exit strategy

- Prepare a proposal on NUC involving the 3 regions on the described research questions.
- Support the about to be formed ICUC-GFU Institutions with additional inter-regional collaborations in the field of NUC.
- Support for ongoing activities (FAO) for training to resolve open questions of the Treaty.
- Collecting information on NUC<sup>2</sup>, providing this information to partners in the three regions, set up a plan to fill information gaps on NUC.
- Include the Treaty and NUC as topics in the documentary film produced by DIVERSEEDS to raise awareness.
- Other?

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<sup>1</sup> See: <http://www.icuc-iwmi.org/files/News/ICUC-News%2059.pdf>

<sup>2</sup> See e.g. <http://www.icuc-iwmi.org/Publications/index.htm> or [www.agrofolio.eu/db](http://www.agrofolio.eu/db)

## 7.0 Public awareness and future DIVERSEEDS activities

### 7.1 Public awareness: introduction

During this session, the meeting participants presented and discussed the objectives and necessary requirements for the short documentary film and the public information event to be held in Asia, the e-conference and plans for future workshops and meetings.

### 7.2 Short documentary film

*Contributed by Camillo Meinhart*

#### **Goals**

##### DIVERSEEDS Documentary Film

Our goal is to produce a documentary film of at least 25 min duration. The movie should contain content of all world regions that are participating in the DIVERSEEDS project. The documentary should have a dramaturgical structure that makes it possible to split it easily into several separated chapters of about three to five minutes. This will make it easier for us to distribute the content. (internet, short features on TV etc...)

##### Publishing the film

- On Television as Documentary as well as a series of short reports
- On Internet – on the DIVERSEEDS Website as well as on public channels like You Tube
- As DVD in educational institutions.

#### **Topic**

As the topic is not a variety of aspects and themes, it is not simple to find a 'red line' that gets all the aspects together to one general main theme, to one dramaturgical thread, the recipient can follow. Nevertheless we found one that goes together with the needs of media attendance:

'THE DIVERSITY OF SEEDS IS IMPORTANT FOR THE SURVIVAL OF MANKIND'

By giving examples from our partner regions, we can prove this thesis. For this, we are hoping for support from our partners within the DIVERSEEDS project.

#### **Dramaturgical structure**

- The teaser is needed to gain interest. For us, the ideal teaser will be the story about the 'Seed vault' in the Norwegian island of Spitsbergen.
- The Introduction will present our thesis, as well as fundamental facts and figures.
- The Chapters represent several standing alone reports that will have been filmed in our partner countries.
- The conclusion is needed to end our film. It is a short repetition of everything that was shown going along with a central message / thesis.

#### **Partners**

What they can do / what we need:

- Help us to find region related topics
- Get in touch with local residents and institutions
- Support us with language skills, find a translator
- Inform us about local habits
- Inform us about technical facilities on site (power supply, voltage,)
- Keep us informed on the topic we covered after our visit if necessary.

### 7.3 Public information events

*Contributed by Angela Meyer*

As part of WP 4, public information events will be organized in China, Thailand and Vietnam by January and February 2008. These events have the purpose to present and discuss the project DIVERSEEDS with the interested public and stakeholders.

The following events are planned:

#### In China

The topic of the public information event to be organized by January 2008 in China will be 'the value of plant genetic resource'. The public's attention will be attracted through the story of a famous animal, the Chinese Panda, and its food, the flowering bamboo, which will be linked to the issue of PGR of bamboo plants. Regarding bamboo, it could be possible to contact another organization to get some support (experts and connection with the press, etc.) – perhaps the International Network for Bamboo and Rattan (INBAR), an important NGO that is current working on an EU-UNDP-China program on diversity of bamboo. Panda, the flowering bamboo and the shortage of food seem to be very pertinent topics for the Chinese public. During the event, the DIVERSEEDS project will be presented and explained to the public and further information on crop domestication use of genetic diversity will be given.

#### In Thailand

The topic of the public information event to be organized by February 2008 in Thailand will be "the value of local plant genetic resources". The public's attention will be attracted through the story of famous jasmine rice. It could be possible to contact another organization to get some support such as Rice Research Centre/Station, University and NGO that are currently working on diversity of rice and other crops.

There are various jasmine rice and medicinal plants in Thailand and the potential use of these seem to be a very pertinent topic for the Thai public. During the event, the DIVERSEEDS project will be presented and explained to the public and information on the use of plant genetic diversity will be given.

#### In Vietnam

The public information event in Vietnam will be organized within the third week of January 2008. The one-day meeting will be organized at the Ministry of Agriculture and Rural Development (MARD) in order to introduce the context of DIVERSEEDS project to policy makers, farmer associations, NGOs, researchers and the press. The discussion with high level-policy makers in Vietnam will also include the ITPGRFA to see the potential and constraints of joining the ITPGRFA. A summary of the meeting will be posted in "Rural today" paper (<http://www.nongthon.net/apm/>) for general public.

### **7.4 Upcoming DIVERSEEDS e-conference and open discussion**

*Contributed by Markus Schmidt*

From March to April 2008 we will carry out an open e-discussion on selected PGR topics. We will invite experts and other interested stakeholders to register for the conference. The e-conference participants should represent countries from Europe and Asia, as well as from other parts in the world, and should engage in an online discussion moderated by DIVERSEEDS. To get the discussion going we will provide an input paper that represents the outcome of the international meeting's selection of key issues. The aim of the e-discussion is to engage a wider circle of interested people to discuss the PGR issues selected by our team and to allow non-project members to interact with our project team. Comments, suggestions and ideas brought forward by the participants will be taken into account for the second round of workshops and the second international meeting.

The e-conference will be moderated by DIVERSEEDS project partners and the main categories of discussion should be related to those we have selected and discussed in the breakout working groups.

The e-conference will take place at: <http://www.diverseeds.eu/forum>

### **7.5 Plans for future regional workshops and second international meeting**

A second round of regional workshops will take place in spring/early summer 2008 and the Second International Meeting (the final meeting of the project) will take place in September 2008 in China. The European partners agreed that the second European workshop would be hosted by IDC in Vienna in May. The second regional workshop in China will be held in Beijing in June 2008. The proposed topic is set as 'toward food security'. The content is suggested as follows:

- Update on DIVERSEEDS project activities
- Presentation of the result of the first international meeting
- Introduction of the refined priority list of PGR issues
- Discussion /comments/agreement on the priority list
- Introduction of the recommended inter-regional cooperation
- Discussion /comments/agreement on the proposed cooperation
- Nominating scientists on potentially specific cooperation
- Seeking Input on the final international meeting and the final report

The second Southeast Asian regional meeting will be held at the Faculty of Agriculture, Khon Kaen University, Khon Kaen, Thailand during March 2008. The meeting will involve representatives of the Department of Plant Science and Agricultural Resources, Hanoi Agricultural University, Viet Nam, Mahasarakham University, Ubonratchatani University, Ratchabhat University, Khon Kaen Rice Research Centre, Chum Pare Rice Research Centre, Khon Kaen Field Crop Research Centre, Mahasarakham Field Crop Research Centre, local medicinal doctors, Integrated Farming's of farmer group leader and graduate students.

The Second International Meeting is scheduled for 9–12th September 2008 in Kunming city of the Yunnan province. In this case, compensatory money should be available and used for inviting other experts or governmental officers. IBCAS is in charge to send out the application for funding but cannot guarantee its approval. If no additional funding is available we have to hold it in Beijing where the institutions of Chinese partners and many other PGR experts are located. The date could be one week earlier to avoid the crowd of the Paralympics Games held in Beijing after the end of the Olympic Games.

#### **7.6 Administrative matters and close of meeting**

Markus Schmidt explained the EC reporting requirements to the project partners and thanked the participants for their contributions.

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**Annex 1. First International Meeting: final programme**

<b>Tuesday 04 December</b>		
<b>15:00 – 17:00</b>	<b>Roundtable discussion at the Food and Agriculture Organization of the United Nations (FAO)</b>	
	Discussion with staff of the Secretariat of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)	<b>All</b>
<b>Wednesday 05 December</b>		
<b>08:30</b>	<b>1.0</b>	<b>Introductory session</b>
		<b>Chair: Brian Ford-Lloyd</b>
08:30	1.1	Welcome from local host
		Toby Hodgkin
08:40	1.2	Introduction of DIVERSEEDS partners and external advisory board
		All
09:00	1.3	Update on DIVERSEEDS project activities and progress
		Markus Schmidt
09:10	1.4	Context and objectives of the first international meeting
		Markus Schmidt
<b>09:20</b>	<b>2.0</b>	<b>Reports of the first round of regional workshops</b>
		<b>Chair: Haifei Zhou</b>
09:20	2.1	Report of first regional workshop in Europe
		Shelagh Kell
09:35	2.2	Report of first regional workshop in SE Asia
		Ngyuen Thanh Lam
09:50	2.3	Report of first regional workshop in China
		Wei Wei
10:05	2.4	Discussion of outcomes of regional workshops, similarities and differences between regions
		All
<b>10:30</b>	<b>COFFEE</b>	

<b>Wednesday 05 December cont'd</b>			
<b>11:00</b>	<b>3.0</b>	<b>Towards an inter-regional dialogue</b>	<b>Chair: Markus Schmidt</b>
11:00	3.1	Review European and Asian partners' lists of PGR issues	Oz Barazani / Zengyan Zhang / Poramate Banterng
11:20	3.2	Agree on the criteria for selecting key issues for inter-regional dialogue	All
11:30	3.3	Preliminary selection of key issues for inter-regional dialogue	All
<b>12:00</b>	<b>LUNCH</b>		
<b>13:30</b>	<b>4.0</b>	<b>ECPGR – DIVERSEEDS – Bioersity inter-regional session</b>	<b>Chair: Jan Engels</b>
13:30	4.1	Introduction to and aims of the joint session	Lorenzo Maggioni
13:40	4.2	Introductions of meeting participants	All
14:00	4.3	Summary of the main outcomes of the Joint ECPGR – DIVERSEEDS – Bioersity Inter-Regional Workshop	Eva Thörn
14:30	4.4	Introduction to DIVERSEEDS and presentation of preliminary list of selected key issues for inter-regional dialogue	Markus Schmidt / Korous Khoshbakht / Poramate Banterng / Wei Wei
<b>15:00</b>	<b>COFFEE</b>		
<b>15:30</b>	<b>ECPGR – DIVERSEEDS – Bioersity inter-regional session cont'd</b>		<b>Chair: Jan Engels</b>
15:30	4.5	Roundtable discussion (introductory statements made by GCDT, FAO, IT/CGRFA and CGIAR)	All
17:00	4.6	Discussion of common ECPGR / DIVERSEEDS / Bioersity issues / opportunities for networking and collaboration	All
17:30	4.8	Summing up and close of session	Jan Engels
<b>20:00</b>	<b>ECPGR / DIVERSEEDS / BIOERSITY SOCIAL DINNER</b>		

<b>Thursday 06 December</b>			
<b>08:30</b>	<b>5.0</b>	<b>Technical workshop</b>	<b>Chair: Karl Hammer</b>
08:30	5.1	Introduction to and aims of the technical workshop	Markus Schmidt
08:35	5.2	Introduction to AEGIS (A European Genebank Integration System)	Jan Engels
09:05	5.3	Strategies for the <i>in situ</i> conservation of crop wild relatives	Nigel Maxted
09:35	5.4	Discussion of key issues arising from presentations	All
<b>10:00</b>	<b>COFFEE</b>		
<b>10:30</b>	<b>Technical workshop cont'd</b>		<b>Chair: Percy Sajise</b>
10:30	5.5	Role of local people for <i>in situ</i> conservation of PGR in Vietnam and Thailand: lessons learned	Ngyuen Thanh Lam
11:00	5.6	Conservation biology and conservation of crop wild relatives in China	Song Ge
11:30	5.7	Discussion of key issues arising from presentations	All
<b>12:00</b>	<b>LUNCH</b>		
<b>13:00</b>	<b>6.0</b>	<b>Selection of priority issues</b>	<b>Chair: Rivka Hadas</b>
13:00	6.1	Review and refinement of the list of selected key issues for inter-regional dialogue/assignment of breakout working groups	Markus Schmidt / All
13:45	6.2	Prioritization of key issues (breakout working groups for selected issues, each working group consisting of partners from the three regions)	All
<b>15:15</b>	<b>COFFEE</b>		

<b>Thursday 06 December cont'd</b>		
<b>15:45</b>	<b>Selection of priority issues cont'd</b>	<b>Chair: Nigel Maxted</b>
15:45	6.3 Working group reports (15 min each)	WG rapporteurs
16:30	6.4 Discussion and agreement on priority key issues	All
17:00	6.5 Summing up and close of session	Markus Schmidt
<b>Friday 07 December</b>		
<b>08:30</b>	<b>7.0 Towards inter-regional cooperation on priority issues</b>	<b>Chair: Korous Khoshbakht</b>
08:30	7.1 Define next steps for inter-regional cooperation on priority issues (breakout working groups) <ul style="list-style-type: none"> <li>• Definition of tasks and challenges</li> <li>• Identification of further key players (and access to database)</li> <li>• Identification of task leaders</li> <li>• Identification of inter-regional funding opportunities</li> <li>• Formulation of master plan (next steps)</li> <li>• Project output and exit strategy</li> </ul>	All
09:30	7.2 Working group reports (10 min each)	WG rapporteurs
10:00	7.3 Discussion and agreement on further activities for selected priority issues	All
<b>10:30</b>	<b>COFFEE</b>	

<b>Friday 07 December cont'd</b>			
<b>11:00</b>	<b>8.0</b>	<b>Public awareness and future DIVERSEEDS activities</b>	<b>Chair: Angela Meyer</b>
11:00	8.1	Public awareness: introduction	Markus Schmidt
11:05	8.2	Short documentary film	Camillo Meinhart / Markus Schmidt
11:20	8.3	Public information events	Veronika Hager / Poramate Banterng / Yinghui Li
11:30	8.4	Upcoming DIVERSEEDS e-conference and open discussion	Markus Schmidt / All
11:40	8.5	Plans for future regional workshops and second international meeting	Wei Wei / Poramate Banterng / Shelagh Kell
12:00	8.6	Preparation of the report of the first international meeting	Shelagh Kell
12:05	8.7	Administrative matters and close of meeting	Markus Schmidt
<b>12:15</b>	<b>LUNCH</b>		

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