



# THE SUWON AGROBIODIVERSITY FRAMEWORK



## THE WAY FORWARD FOR MANAGING AGROBIODIVERSITY FOR SUSTAINABLE AGRICULTURE IN THE ASIA-PACIFIC REGION

Rural Development Administration, Suwon, Republic of Korea  
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## Rationale

The Asia-Pacific region is the center of diversity of many important species of crops and livestock. Resource poor farmers in the region are largely dependent on the agrobiodiversity of minor crops, their wild relatives and other species of plants and animals for their food security and livelihood. The rich mosaic of people and cultures found in the region have contributed to the enormous diversity of cultivated plants and domesticated animals. Population migration and the trade enabled introduction of new species and varieties. Additionally, the genetic diversity in both indigenous and introduced species has been enhanced through extensive exchange of germplasm within the region.

Agrobiodiversity is the foundation of sustainable agricultural development. Plant Genetic Resources for Food and Agriculture (PGRFA), that constitute a major part of current agrobiodiversity, are an essential resource to meet our food security. However, while the threats to these resources are growing, the efforts to conserve and use genetic diversity are still insufficient. This has been further confounded by the large scale adoption of few improved varieties resulting in displacing some of the landraces on farmers' fields. Also, the traditional knowledge, associated with the use of old varieties/landraces, has somehow remained undocumented and is rapidly disappearing. Reduction of agricultural biodiversity on the farm can significantly increase the vulnerability of farmers and existing agro-ecosystems. In recognition of the value of genetic diversity for the society, and also in view of the concerns of their loss, concerted efforts have been made by various international/regional organizations and national governments in the conservation and promotion of sustainable use of available crop and animal genetic resources. The sustainable conservation of agrobiodiversity can help in achieving the Millennium Development Goals (MDGs) since use of PGRFA is central to food security. However, this can only be possible through easy access and benefit sharing (ABS) of PGRFA and Animal Genetic Resources (AnGR).

The 9<sup>th</sup> session of the Commission on Genetic Resources for Food and Agriculture, held in 2002, emphasized "the importance of promoting the sustainable use of PGRFA and AnGR, through germplasm characterization, evaluation, genetic enhancement through plant breeding, seed production and distribution; and its contribution to food security". Promoting sustainable use of biodiversity is also one of the seven 2010 Biodiversity Targets of Convention on Biological Diversity (CBD) (Decision VII/30). Furthermore, the CBD at its 8<sup>th</sup> Conference of the Parties (COP 8) held in Curitiba, Brazil in 2006 adopted a 'Cross-cutting Initiative on Biodiversity for Food and Nutrition', to be developed under the leadership of the Food and Agriculture Organization of the United Nations (FAO) and Bioversity International. These priorities have also been endorsed by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)-Article 6: Sustainable Use of Plant Genetic Resources. "Genetic Resources Partnership" is also identified as one of the four areas for elaboration under the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB), being implemented by FAO. It is now increasingly accepted that future crop productivity increases can only be achieved through an increased use of PGRFA, including wild relatives and exotic materials. It is for this reason, the United Nations General Assembly has declared 2010 as an International Year of Biodiversity (Resolution 61/204 dated 20 December 2006) to bring greater awareness and promote new initiatives that can reduce the current loss occurring globally and enhance activities aiming mainly at conservation through use.

APAARI, in collaboration with its stakeholders, especially Bioversity International and other CGIAR Centers, viz., CIMMYT, IRRI, ICRISAT, ICARDA, ILRI, ARIs, FAO, GFAR, CFF, AVRDC and other Regional Fora, and the National Agricultural Research Systems (NARS) continue to review the role and direction of agricultural R&D to efficiently address above challenges. Several stakeholders have also initiated programmes to promote

conservation and use of agrobiodiversity for sustainable agricultural production in the Asia-Pacific region. Four sub-regional networks have been organized to promote regional collaboration for strengthening PGRFA conservation and use. These are: (i) South Asia Network on Plant Genetic Resources (SANPGR), (ii) the East Asia PGR Network (EA-PGR), (iii) Regional Cooperation for Plant Genetic Resources in Southeast Asia (RECSEA-PGR) and (iv) The Pacific Plant Genetic Resources Network (PAPGREN). In addition, there are also several commodity focused PGR networks like the Banana Asia Pacific Network (BAPNET), the International Coconut Genetic Resources Network (COGENT), Cereals and Legumes Asia Network (CLAN), and the International Network for the Genetic Evaluation of Rice (INGER). These sub-regional networks are operated mostly by the CGIAR Centers in close partnership with APAARI.

As a part of these ongoing efforts, and in recognition of 2010 as an International Year of Biodiversity, APAARI had organized an International Symposium on "Sustainable Agricultural Development and Use of Agrobiodiversity in the Asia-Pacific Region", in partnership with Rural Development Administration (RDA), Republic of Korea; Global Forum for Agricultural Research (GFAR); Bioversity International; FAO and other International Centers such as CIMMYT, ICARDA, ICRISAT, IRRI, ILRI and AVRDC during 13 - 15 October, 2010 in Suwon, Republic of Korea. The symposium provided an excellent opportunity to review, identify and redefine the role and directions of agricultural R&D, especially in the context of conservation through use of valuable agrobiodiversity for sustainable agricultural development. It also helped in agreeing on a 'Way Forward' for the access and benefit sharing of valuable genetic resources.

The agrobiodiversity research and development framework for the Asia-Pacific region, adopted during the Symposium aims to provide a strategic approach, towards both management and use through regional collaboration and partnerships among stakeholders.

## Challenges and Opportunities

The attainment of MDGs, as reviewed recently by the world leaders (September, 2010) particularly on alleviating poverty, assuring food and nutrition security and environmental sustainability, against the background of declining natural resources, together with changing climate scenario, remains a daunting task.

Therefore, initiatives through conservation and use of agrobiodiversity must respond to these challenges. It is also evident that the contribution of agrobiodiversity in ensuring sustainable and productive agriculture remains vital to food security. The reservoir of genetic resources remains a main resource for food security, and equally important for improving nutrition, product quality, product diversification and food safety.

Responding to the emerging challenge of climate change, greater access to a range of varieties that can help farmers deal with drought or flood, will be required. Exploring the genetic resources available will require new tools (Genomics, GIS, ICT), technologies and innovative approaches for their conservation and use.

All these challenges are compounded by the continuing loss of genetic diversity of plants, livestock and aquatic resources. At the same time, available agrobiodiversity can contribute significantly towards addressing the concerns of food security, poverty, environmental degradation, urbanization, climate change, etc. Hence, effective conservation and sustainable use of available genetic resources becomes a major priority in the region.



Genetic Diversity in pearl millet

PHOTO BY BIODIVERSITY INTERNATIONAL

## Integrated Approach

The proposed integrated approach seeks to ensure the continued availability of critical genetic resources not only for the improvement of agricultural productivity and resilience of the production systems but also to improve the quality of the supply chains through effective collaboration of different stakeholders working on a broad range of genetic resources for food and agriculture. It also builds on current partnerships and eco-regional experiences involving national and international organizations and for integrating partnerships across the different sectors of genetic resources.

The vision of the proposed approach draws lessons from existing collaboration between different CGIAR centres, NARS, Regional Fora and all the stakeholders in the region - a collaboration that now needs to be strengthened to a higher level of performance and accountability.

An integrated systems approach would intrinsically be more useful in the long run since it brings together work on microbes, crop plants, forest trees, livestock and fish genetic resources. It should also combine research on genetic, biological, agronomical, socio-cultural, market and economic aspects. It will encourage development of national plans that will focus not only on major commodities that are important for our food security but also on other crops, livestock and aquatic resources. Finally, it encourages the different organizations and local communities to work in partnership for collective actions. This approach will maximize the resources and opportunities to have an agile response to new, yet unforeseen developments in understanding diversity and promoting use through research, conservation, evaluation and documentation.

## Focus of Research and Development

### 1. Studies to enhance use of genetic resources through subset approaches:

There are many methods/approaches to sample germplasm collections to create subsets that are manageable in size by the researchers to quickly evaluate/characterize (phenotypic/genotypic) genetic resources to select useful accessions for use in pre-breeding. These approaches include core, mini core, Focus Identification of Germplasm Strategy (FIGS), composite and reference collections and trait-specific subsets. Enhancing research efforts on certain underutilized crops and their wild relatives may also be necessary to cover gaps in existing knowledge concerning their benefits to the society.

### 2. Pre-breeding and participatory plant breeding to enhance utilization of genetic resources in crop improvement programmes:

There is a need to encourage the use of genetic resources [especially underutilized species, their relatives and other useful species such as non-timber forest products (NTFPs), medicinal plants, etc.] to exploit untapped genes, broaden the genetic base of existing cultivated varieties and develop the new ones. This will be essential for coping better with the challenges of increasing productivity, improving quality, managing new pests and diseases, and adapting to climate change and abiotic stresses. It will also be important to develop partnership with farmers and other stakeholders to explore alternative approaches for genetic improvement such as participatory plant breeding and community based conservation activities.

### 3. Strategies and technologies to enhance *in situ* and *ex situ* conservation through use:

The aim must be to generate and synthesize coherent messages with appropriate information and knowledge, evidence and tools which can contribute to the understanding of genetic diversity and its effective use, especially

- The incorporation of information/knowledge and new technologies (genomics) into integrated approaches can promote the understanding of the diversity distribution and identification of useful traits for adaptation to climate change, and other abiotic and biotic stresses.
- Research should explore the potential of consumer preferences, certification strategies, geographic indication, community and farmers' rights or payment systems for ecosystem services to secure agrobiodiversity for the future and exploit its direct values and uses. A market oriented approach is very important in enhancing the economic status of farmers involved in conservation and use of genetic resources.
- Efforts need to be made to empower traditional custodians of biodiversity in the region for *in situ* conservation on-farm to enhance conservation of landraces and wild relatives of cultivated crops and livestock, both *in situ* and on-farm together with its associated knowledge.
- Apply proven modalities for community based biodiversity conservation with partners especially the civil societies, such as supporting communities to sustainably use local genetic diversity to reduce vulnerability and crop loss and to sustain the resilience and ecosystem services of their production systems.
- Promote cost-effective complementary *ex situ* and *in situ* strategies for conservation of genetic resources.

### 4. Assessment of the agrobiodiversity richness and the status relative to economic, social and cultural (traditional knowledge) factors:

- Support studies related to the assessment of genetic erosion and restoration of lost diversity across the region jointly with various national and international partners including advance research organizations (to access new methodologies).
- Assessing the relationship of poverty and other socio-economic factors that affect the genetic diversity for developing various livelihood options or for the payment for ecosystems services associated with conservation and use.
- Greater emphasis on documenting traditional knowledge (TK) and linking its use in both conservation and utilization of PGR in the context of benefit sharing as well as exchange of knowledge among communities.

### 5. Interdisciplinary studies on the invaluable ecosystem services for agriculture that agricultural landscapes, forests and other mainly wild ecosystems provide (following CBD-COP 5 Ecosystems Approach):

Degradation of wild ecosystems in the landscape has important implications to agriculture and food production. Compensating the lost ecosystem services with artificial irrigation systems, growth media, fertilizers or pesticides is potentially not only costly but probably not even viable in many resource-poor areas. There is a need to better understand the relationships between society and nature in the socio-ecological landscape (as those envisioned in the CBD-COP 10 Satoyama Initiative). It is, therefore, worth looking into the following aspects:

- The role of wild ecosystems in providing services for forest and other agricultural systems, the processes and interactions which maintain these services, and the threats that they are facing.
- Planning rehabilitation and maintenance of diverse landscape mosaics of agricultural lands and viable wild ecosystems including policies that support their creation and maintenance.
- Adaptation of wild ecosystems to changing environment as a prerequisite for the continued provision of the services as their demand increases.

### 6. Information systems and tools for data exchange:

The aim is to develop or adapt an information facility for online access to a wide range of datasets on genetic resources. The rapidly changing ICTs open up new opportunities to collect, store and analyze genetic resource information, and facilitate its exchange among researchers, local communities and countries. The integration of geo-references as the primary key for all forms of data, capitalizing on social media, data-interchange protocols, electronic germplasm catalogues and directories, GENESYS, GRIN Global and others. Common descriptors with guidelines for recording and reporting information should be extended to increase comparability and usability among datasets.

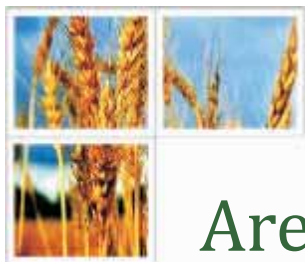
### 7. Supportive policies, laws and strategies to enable enhanced PGR exchange and use:

There is need to focus on assessing the impacts of international laws and policies on the use and conservation of genetic resources. Support is needed to assist countries that have signed the ITPGRFA to have the necessary regulatory/legislative mechanisms to implement the Treaty effectively. A well developed ABS framework must also be developed to provide legal mechanisms necessary to accelerate sharing of genetic resources.

## ACRONYMS

- ABS:** Access and Benefit Sharing  
**AnGR:** Animal Genetic Resources  
**APAARI:** Asia Pacific Association of Agricultural Research Institutions  
**ARI:** Agricultural Research Institute  
**AVRDC:** The World Vegetable Center  
**BAPNET:** Banana Asia Pacific Network  
**CAAS:** Chinese Academy of Agricultural Sciences  
**CBD:** Convention on Biological Diversity  
**CFF:** Crops for the Future  
**CGIAR:** Consultative Group on International Agricultural Research  
**CIMMYT:** International Maize and Wheat Improvement Center  
**CLAN:** Cereals and Legumes Asia Network  
**COGENT:** International Coconut Genetic Resources Network  
**COP:** Conference of the Parties  
**CSOs:** Civil Society Organizations  
**EA-PGR:** East Asia Plant Genetic Resources Network  
**EURISCO:** European Plant Genetic Resource Catalogue  
**FAO:** Food and Agriculture Organization of the United Nations  
**FIGS:** Focus Identification of Germplasm Strategy  
**GFAR:** Global Forum for Agricultural Research  
**GIPB:** Global Partnership Initiative for Plant Breeding Capacity Building  
**GPA:** Global Plan of Action  
**GPA-NISM:** Global Plan of Action-National Information Sharing Mechanism  
**ICARDA:** International Center for Agricultural Research in the Dry Areas  
**ICRISAT:** International Crops Research Institute for the Semi-Arid Tropics  
**ICTs:** Information and Communication Technologies  
**ILRI:** International Livestock Research Institute  
**INGER:** International Network for the Genetic Evaluation of Rice  
**IRRI:** International Rice Research Institute  
**ITPGRFA:** International Treaty on Plant Genetic Resources for Food and Agriculture  
**MDGs:** Millennium Development Goals  
**NARS:** National Agricultural Research Systems  
**NBPGR:** National Bureau of Plant Genetic Resources  
**NIAS:** National Institute of Agrobiological Sciences  
**NTFPs:** Non-Timber Forest Products  
**PAPGREN:** Pacific Plant Genetic Resources Network  
**PGR:** Plant Genetic Resources  
**PGRFA:** Plant Genetic Resources for Food and Agriculture  
**PRA:** Pest Risk Analysis  
**RDA:** Rural Development Administration  
**RECSEA:** Regional Cooperation for Plant Genetic Resources in Southeast Asia  
**SANPGR:** South Asia Network on Plant Genetic Resources  
**SINGER:** System-wide Information Network for Genetic Resources  
**SMTA:** Standard Material Transfer Agreement  
**TK:** Traditional Knowledge





## Areas of Regional Collaboration

### 1. Developing national agrobiodiversity plans and integrating them into regional and global collaborative frameworks:

The development of national plans and integrating them into regional collaborative frameworks are important to enhance both food security and sustainable agricultural development. In the absence of such national agrobiodiversity plans and regional collaborative frameworks, it is difficult to advocate the importance of agrobiodiversity to the policy makers and other stakeholders. This will require assessment of national and regional priorities for agrobiodiversity in view of the emerging challenges. To achieve this, the facilitation role of regional fora such as APAARI, CGIAR centres, FAO, etc. is necessary and must be promoted.

### 2. Increasing R&D collaboration on agrobiodiversity conservation and use in the region:

Agrobiodiversity cuts across national boundaries and there are many common issues and concerns that need multi-country partnerships and sharing of experiences. Collaboration and support are very much needed in collecting, understanding and maintaining endangered crop, livestock and fisheries genetic resources. More R&D collaboration for underutilized crops in the region such as: small millets (finger millet, kodo millet, barnyard millet, foxtail millet, and little millet), minor but locally important legumes (black gram, rice bean, lablab bean, horsegram, etc.), cultivated minor and wild tropical fruits, and indigenous vegetables will ensure needed progress in improving these crops through plant breeding efforts.

### 3. Increased sharing of information and data on genebank collections:

To further improve access and sharing of genetic resources in the region, the sharing of information on national genebank collections is a prerequisite. This could be on the model similar to that of CGIAR's SINGER or the European countries' EURISCO where data and information from different genebanks are available from a common searchable database. These databases are needed to accelerate the access to the collections held by the different genebanks. The national and international centers must ensure sharing of information being critical for enhanced use of genetic resources (i.e. GENESYS) following an open source system. The sustained use and maintenance of the GPA-NISM in many Asia-Pacific countries that have this database and its development in other countries should also be supported. The GPA-NISM provides the big picture of PGRFA in different countries beyond the genebanks.

### 4. Strengthening agrobiodiversity capacity, education and public awareness:

Capacity development needs to be addressed at the individual, systemic and institutional levels. Continuing capacity development in national systems is needed since often well-trained staff are either promoted or transferred. This can be in the form of short-term as well as formal degree courses. The capacity of indigenous and local communities to assess, inventorize and monitor genetic resources and related TK will also have to be developed. At the institutional level, emphasis is needed for the administrative framework; funding and resource management; mechanisms for follow-up, monitoring and assessment; in addition to strengthening policy analysis and capacity. Public awareness and education on agrobiodiversity should start at an early age with focus on the basic appreciation of genetic resources from their own locations, knowing their value for food, nutrition, health and to humanity. Other points to consider are as follows:

- Several universities in the region currently provide degree courses in plant and animal genetic resources but suffer from low enrolment. There is a need to make the curriculum more innovative and interesting (agrobiodiversity in food, nutrition, health and humanity) to young people and also make it relevant to supporting the extension workers. There is also a need to increase awareness and support through scholarship programs to these genetic resources related degrees and courses.
- The more advanced organizations in the region are currently offering short-term courses on PGR and AnGR management (e.g. RDA, South Korea; Japan NIAS Genebank, Japan; NBPGR, India; CAAS, China) to enhance the capacity of different genebanks in the region. Such courses should be expanded and be made more specialized to cover new tools (e.g. DNA fingerprinting, information technology), approaches (complementary and integrated approach) and strategies. Specific courses that will improve the access of researcher to donors and grant information including better skills to grant writing and producing effective publications are also needed.
- There is a need to lay greater emphasis on public awareness on agrobiodiversity targeting policy makers and consumers, especially in the context of importance of conservation. The importance of underutilized tropical fruit species, crops, vegetables, forages and medicinal plants for food security, nutrition and income generation also needs to be emphasized. The participation of rural communities, the private sector and CSOs in conservation can help in ensuring financial support for national genebanks.
- There is also an urgent need for policy advocacy on agrobiodiversity for the officials involved in developing national policies and international treaties and conventions such as ITPGRFA and CBD.

## 5. Enhancing exchange and use of genetic resources:

- Through available options for the multilateral system for PGR exchange using SMTA, especially in those countries that have signed ITPGRFA.
- Empowering the farmers' organizations to participate in decision making related to implementation of farmers' rights as stipulated in the ITPGRFA.
- Enhanced cooperation on plant quarantine issues, including pest risk analysis (PRA) for safe movement and exchange of germplasm.
- Promoting the implementation of the GPA through specific actions at the national and regional levels through policy advocacy, strengthened R&D programmes and the use of NISM-GPA.
- More active facilitating role of APAARI on communications between the Treaty Secretariat and the NARS, and between NARS and policy makers.

## 6. Role of stakeholders in strengthening agrobiodiversity conservation and use:

In view of limited funding resources in the region, enhanced collaboration between international and regional agencies, CSOs, the private sector, and regional networks will help in promoting genetic resource conservation and use.

- The proposed emphasis on research relating to genetic resources in the different Consortium Research Programmes should ensure better integration with national plans and regional and global strategies/collaborative frameworks.
- The sub-regional networks on genetic resources will have better sustainability if linked with regional/global organizations such as APAARI, GFAR and FAO with adequate financial support and active facilitation roles of CGIAR centres.
- Regional PGR and crop networks should emphasize on strengthening partnerships for the exchange of genetic resources that benefit users and germplasm providers directly (including wild relatives, neglected and underutilized crops, forest trees and NTFPs).
- Pursue partnership with CSOs and the private sector for more effective public awareness, education and advocacy. Civil society and the private sector can contribute to the development of a more holistic perspective to support agrobiodiversity initiatives in the region. The private sector can also help in generating additional resources, keeping in view corporate social responsibility.

# Conclusions

The vast agrobiodiversity in the Asia-Pacific region is a valuable resource to achieve the MDGs, especially food and nutrition security and agricultural sustainability. These resources are to be used and conserved to ensure productivity and quality, adaptation to climate change and sustainable agriculture development. Effective conservation and utilization of this capital would obviously require increased focus and investment both at the national and regional levels, through greater involvement of all stakeholders. Also there is need for greater public awareness and policy advocacy for enhanced support for AR4D efforts in the region. International and regional agencies, CSOs, private sector, and regional networks have a crucial role to play in strengthening agrobiodiversity conservation and use in the Asia-Pacific. Enhanced collaboration between national and international research institutions and civil society would help in the holistic understanding and importance of agrobiodiversity. The following actions will ensure optimal participation of different stakeholders and the building of new partnership opportunities:

- Benefitting from the new tools and technologies through new alliances among scientists working on plant and animal breeding, molecular biology, bioinformatics and biometrics that integrates genetic resources, genomics and genetic improvement programmes.
- Laying focus on genetic resources in different CGIAR research programmes should be analysed for better integration into national plans and regional and global collaborative frameworks, to avoid gaps and overlaps.
- Enhance regional and crop improvement programmes and PGR networks to ensure capacity development and improved exchange of materials and their use in the Asia-Pacific region. Such networks must be facilitated by the CGIAR centres to identify regional priorities and implement region- wide PGR-related activities. Network activities should also focus more on underutilized crops of the region. The different sub-regional networks will also be more sustainable if linked with regional or global initiatives, such as those of APAARI and GFAR.
- Strengthening partnerships with CSOs and the private sector to contribute more effectively towards public awareness, education and policy advocacy. CSOs and the private sectors can contribute significantly towards development of a more holistic perspective to support agrobiodiversity related initiatives in the region. Private sector can also help in this especially for resource mobilization and use of new tools and innovations in exploiting genetic resources.

Finally, there is a need to form new partnerships involving farmers and other stakeholders who ultimately guard the agrobiodiversity and its associated knowledge. Active collaboration with them will ensure recognition of farmers' needs and concerns, optimal planning and monitoring of activities, participation in plant and animal breeding activities, adoption of innovations, documentation and use of TK, and usefulness of research for the poor. All above initiatives will contribute to the holistic understanding of agrobiodiversity conservation and use for the settlement of humankind.





## Acknowledgements

The APAARI Executive Committee endorses the Suwon Framework on Agrobiodiversity that was adopted by the participants of International Symposium on Sustainable Agricultural Development and Use of Agrobiodiversity in the Asia-Pacific Region held from 13-15 October 2010 in Suwon, Republic of Korea.

We thank all the participants of the symposium for adopting this framework in order to have a Road Map for a more effective management of agrobiodiversity for sustainable agriculture in the Asia Pacific region. We acknowledge all the member country representatives and NGO/CSO representatives for ensuring that the framework embodies not only their concerns but also the collective vision. We thank the symposium speakers, resources persons and experts for their contribution in the formulation of this framework.

We also acknowledge the support of our host-the Rural Development Administration (RDA), co-organizers – Bioversity International and Global Forum for Agriculture Research (GFAR), and the co-sponsors, namely, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Rice Research Institute (IRRI), International Wheat and Maize Improvement Center (CIMMYT), International Center for Agricultural Research in Dry Areas (ICARDA), International Livestock Research Institute (ILRI), Food and Agriculture Organization of the United Nations (FAO), and AVRDC-The World Vegetable Center.

We also appreciate the excellent technical input provided by the working group consisting of Drs. Raj Paroda, Leocadio Sebastian and Prem Mathur for meticulously planning and guiding the process while ensuring that all the inputs of the participants were duly considered.

It is our expectation that this Framework will catalyze all the stakeholders in Asia-Pacific region to accelerate activities relating to conservation through use of valuable genetic resources.

*APAARI Executive Committee*

