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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 9 of the Provisional Agenda

Fifteenth Regular Session

Rome, 19 – 23 January 2015

SUBMISSIONS BY INTERNATIONAL INSTRUMENTS AND ORGANIZATIONS ON THE PRIORITIZED THEMES OF THE SESSION

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I. INTRODUCTION

1. The Commission, at its Fourteenth Regular Session, thanked the international instruments and organizations for their submissions and commended their work in supporting the activities of the Commission. The Commission requested its Secretary to continue seeking inputs on prioritized themes of the regular sessions from international instruments and organizations and to make them available to the Commission, for its information.¹

2. On 3 July 2014, the FAO Deputy Director-General, Coordinator Natural Resources, invited international instruments and organizations, including inter-governmental and non-governmental organizations, to provide focused information on their programmes, activities and policies relevant to the prioritized themes of the Commission's Fifteenth Regular Session:

Animal genetic resources

- Presentation of *The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture*

Forest genetic resources

- Follow-up to the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources

Plant genetic resources

- Review of implementation of the updated Global Plan of Action

Micro-organisms and invertebrates

- Review of work on micro-organisms and invertebrates

Cross-sectorial matters

- *The State of the World's Biodiversity for Food and Agriculture*: Consideration of the internalization of the ecosystem approach to biodiversity management in agriculture, forestry and fisheries;
- *Access and benefit-sharing for genetic resources for food and agriculture*: Consideration of draft elements to facilitate domestic implementation of access and benefit-sharing for different subsectors of genetic resources for food and agriculture;
- *Biotechnology*: Review of the work of the Commission's Working Groups on the application and integration of biotechnologies for the conservation and sustainable utilization of genetic resources for food and agriculture;
- *Climate Change*: Draft guidelines to support the integration of genetic diversity into national climate change adaptation planning.

3. The submissions are presented in the alphabetical order of the instruments and organizations. They are given as submitted, in the language in which they were received.

4. The following international instruments and organizations provided submissions in response to the invitation by the Deputy Director-General, Coordinator Natural Resources: Asian Development Bank (ADB); Centre de coopération internationale en recherche agronomique pour le développement (Cirad); Global Forum on Agricultural Research (GFAR); International Atomic Energy Agency (IAEA); International Centre of Insect Physiology and Ecology (*icipe*); SEARICE; Slow Food; Third World Network; United Nations Convention to Combat Desertification (UNCCD); and World Intellectual Property Organization (WIPO).

5. Additional reports have been submitted by: *the Secretariat of the Convention on Biological Diversity*², *the Global Crop Diversity Trust*³; *the CGIAR Consortium of International Agricultural Research Centres*⁴ and *the International Treaty on Plant Genetic Resources for Food and Agriculture*⁵.

¹ CGRFA-14/13/Report, paragraph 119.

² CGRFA-15/15/Inf.30.

³ CGRFA-15/15/Inf.31.

⁴ CGRFA-15/15/Inf.32.

⁵ CGRFA-15/15/Inf.26.

II. SUBMISSIONS ON THE PRIORITIZED THEMES OF THE COMMISSION'S FIFTEENTH SESSION

1. ASIAN DEVELOPMENT BANK (ADB)

ADB initiatives with biodiversity / genetic diversity component:

Project Title	Project/TA Number	DMC	Brief Description
Scoping/desk study on vulnerability of biodiversity and ecosystem services	TA 7326 TA Closed: 31 May 2011	Sri Lanka	Review of existing practice(s) on genetic diversity in the country; study mentioned existence of “some measures” towards this on “selected species”; genetic diversity were found to be high among indigenous vegetables; identified reduced usage of local breeds as impediment to genetic diversity of livestock (p. 39); provided adaptation options that could enhance/support biodiversity and genetic diversity (p. 62)
Greater Mekong Subregion Biodiversity Corridor Initiative	TA 6213 TA Closed: 30 March 2007	Cambodia	Sought to support the broad based agenda of sustainable development through identifying and prioritizing terrestrial biodiversity conservation of strategic importance to the development perspective. However, the outcome did not relate biodiversity conservation as a tool for adaptation.
Enhancing Biodiversity Through Market-Based Strategy: Organic Agriculture	ADBI WP No. 155 published in 15 October 2009	Regional	Working paper published by ADBI that stresses on the importance of diversity in plant genetic resources and argues for a comprehensive market based incentives to ensure that small holder farms continue to conserve local/indigenous plant resources.
ADB-Tropical Fruit Trees Project	P33121 TA Closed: October 2004	Regional	Study: Conservation and utilization of native tropical fruit tree species biodiversity in Asia

DMCS' NATIONAL PLANS /ACTIONS THAT CONSIDER GENETIC DIVERSITY AS PART OF ADAPTATION PLANS:

Document Type	DMC	Brief Description
National Adaptation Programmes of Actions (NAPAs)	Myanmar	Reduction of the “vulnerability of local farmers in Myanmar”s three agro-ecological zones to climate change impacts through locally relevant technologies, climate-resilient rice varieties and ex/in-situ conservation of plant genetic resources. ”
National Communications under Adaptation – Forest Resources	Myanmar	Develop climate-resilient genetic strains
National Communications – Adaptation – Forest Resources	Malaysia	“Components of biodiversity namely plant and animal species, ecosystem and genetic materials can be better conserved through the establishment of conservation corridors between forests. Genetic resources that may require further adaptation measures could be conserved through the establishment of gene banks. ”
National Communications – Adaptation – Agriculture	Vietnam	Establish genetic conservation plans and gene banks
National Communications – Adaptation – Agriculture	Nepal	Development of genetically adaptive varieties

National Communications – Adaptation – Coastal and Fisheries Resources	Pakistan	Ex-situ Conservation: This is an important tool basically adapted for preserving genetic diversity. Gene banks, seed banks, zoos and botanical garden are the options to conserve species out of their natural environment.
National Communications – Adaptation – Agriculture	Bhutan	Increase access to improved genetic resources resistant to a biotic and biotic stresses
National Communications – Adaptation – Agriculture	India	Genetic adaptation
National Communications – Adaptation – Agriculture	Kazakhstan	Integrate management of genetic resources: conservation, improvement and rational use of the agro-biodiversity in climate change conditions
National Communications – Mitigation – Agriculture	Tonga	Breeding for higher genetic merit animals (lower CH ₄ emitters) that produce a given amount of product, and hence would therefore be beneficial in terms of methane emission mitigation.
National Communications – Mitigation – Agriculture	Myanmar	Promote stress-resistant genetic strains of crops, encourage the increased use of high-quality stress resistant plant varieties, bio-fertilizers and eco-friendly pesticides.
National Action Plan – Adaptation	Indonesia	There is a need to conduct an inventory of Indonesia's biodiversity, thus, genetic bank for plant species of Indonesia should be established

2. CENTRE DE COOPÉRATION INTERNATIONALE EN RECHERCHE AGRONOMIQUE POUR LE DÉVELOPPEMENT (Cirad)

a) English

CIRAD is a French research centre working with developing countries and French's overseas territories to tackle international agricultural and development issues. Conservation, management and use of biological and genetic resources are at the heart of CIRAD activities, in relation to the huge global challenges posed to the agricultural sector in a rapidly evolving world: food security, energy transition, environmental conservation, climate change...

One challenge: placing biodiversity at the heart of agronomic research

Biodiversity is the source of all agricultural production, but modern intensive agriculture has streamlined practices, products and landscapes. Enhancing the sustainability of agricultural systems, reassessing production strategies, broadening the range of crop species and varieties and rethinking landscape organization are the challenges facing an alternative type of ecologically-oriented agricultural intensification. Farmers' know-how and innovation capacities are essential for devising sustainable production strategies to address future needs.

CIRAD's activities

1) Biodiversity and production

Agricultural research must take all living organisms and their interactions in landscapes into account to design sustainable production systems tailored to peoples' needs. CIRAD, in collaboration with its partners, is focusing on:

- Diversifying agricultural objectives: food production, environmental, adaptive, etc.
- Integrating local production and know-how and supporting technical and social innovations
- Adapting key species such as rice and sorghum to climatic changes
- Understanding and making use of species-ecosystem interactions to enhance risk management
- Managing relevant germplasm collections, ex situ and in situ

2) Biodiversity, regulation, transformation and resilience

In a changing environment, it is essential to gain greater insight into the regulating effects of biodiversity if we are to support rural societies in their adaptation and transformation of biological, technical and social systems.

CIRAD's research aims to:

- Understand the role of genetic and species diversity in the regulation of agricultural systems
- Account for different spatiotemporal scales related to changes, disturbances, breakdowns, etc.
- Assess the effects of different biodiversity management strategies in biological, technical and social areas

3) Biodiversity, poverty alleviation and equity

CIRAD and its partners study the conditions in which biodiversity conservation, restoration and use could contribute to fighting poverty. This involves investigating how to:

- Make more effective use of know-how, genetic resources and services provided by biodiversity
- Manage the transition from degraded systems to more biodiversified systems
- Integrate biodiversity in policies to reduce inequality
- Support collective institutions and management practices affecting biodiversity

4) Biodiversity, food processing and nutrition

Using local varieties and species of fruit, vegetables and microorganisms can overcome nutritional imbalances and help combat malnutrition above and beyond the basic caloric intake.

CIRAD's research on sustainable food systems aims to:

- Analyse, promote and preserve the nutritional, organoleptic and functional properties of local resources and produce
- Improve the nutritional quality of foods, especially via fermentation processes using the local microbial diversity.

Finally, following its mandate of collaborative development-oriented research, CIRAD seeks for equitable and smooth collaboration worldwide. CIRAD was the first research organization in France to develop guidelines for the transfer of genetic resources (first published in 2001 and updated in 2011) to help researchers to comply with their international obligations. CIRAD has also developed an online tool that generates the appropriate written agreement in accordance with the legal status of the plant genetic resources being transferred (Géné-PI). At the request of the international Treaty Secretariat in 2007, this software has been further developed and adapted for the implementation of the multilateral system of the ITPGRFA (Gene-IT). Based on its practical and policy experience, CIRAD is also providing support on issues related to Access and Benefit Sharing for GRFA, in particular in relation to the draft elements to facilitate domestic implementation of access and benefit sharing for different subsectors of genetic resources for food and agriculture.

b) Français

Le Cirad est un organisme de recherche qui répond, avec les pays du Sud et dans l'Outre-mer Français, aux grands enjeux de l'agriculture et du développement. Les questions de conservation, de gestion et d'utilisation des ressources biologiques et génétiques sont au cœur de ses activités, en lien avec les multiples défis auxquels l'agriculture doit répondre pour faire face aux mutations actuelles: sécurité alimentaire et énergétique, conservation de l'environnement, changements climatiques...

Un défi : remettre la gestion de la biodiversité au cœur de la recherche agronomique

La biodiversité est la source de toute production agricole, mais l'agriculture moderne intensive a homogénéisé les pratiques, les productions et les paysages. Assurer une plus grande durabilité des systèmes agricoles, réexaminer les modes de production, élargir la gamme des espèces cultivées et des variétés et repenser l'organisation des paysages, tels sont les enjeux d'une autre intensification, écologique celle-ci, de l'agriculture. Les savoirs et les capacités d'innovation des producteurs seront précieux pour inventer des modes de production durables répondant aux besoins futurs.

L'action du Cirad

Le Cirad œuvre pour améliorer les conditions de vie des populations les plus démunies. Avec son réseau mondial de partenaires, il produit de nouvelles connaissances, il accompagne le développement agricole et il aide les populations à faire face aux grands défis de l'agriculture et de l'alimentation. Gérer durablement la biodiversité agricole fait partie de sa mission.

1) Biodiversité et production agricole et alimentaire

La recherche agronomique, pour concevoir des systèmes de production durables et des cultures adaptées aux besoins des populations, doit prendre en compte l'ensemble du vivant et de ses interactions au sein des systèmes de production.

Avec ses partenaires, le Cirad se mobilise pour :

- Diversifier les objectifs des agricultures : alimentaires, écologiques, adaptatifs...
- Adapter des espèces majeures comme le riz, le sorgho aux évolutions climatiques
- Mieux comprendre et exploiter les interactions entre espèces des écosystèmes cultivés pour mieux gérer les risques
- Intégrer les productions et les savoirs locaux, accompagner les innovations techniques et sociales

- Gérer des collections pertinentes de ressources génétiques, ex situ et in situ
- Organiser les paysages

2) Biodiversité et régulation, transformation et résilience

Face aux changements, pour renforcer les effets régulateurs de la biodiversité sur les systèmes biologiques, techniques et sociaux, il faut mieux les connaître et les caractériser. Les recherches du Cirad visent à :

- Comprendre le rôle de la biodiversité génétique et spécifique dans la régulation des systèmes agricoles
- Prendre en compte les différentes échelles d'espace et de temps relatives aux transformations, aux perturbations, aux ruptures...
- Evaluer les effets de différents modes de gestion de la biodiversité dans les domaines biologiques, techniques et sociaux
- Accompagner les populations rurales dans leur adaptation aux changements

3) Biodiversité et équité

Le Cirad et ses partenaires étudient les conditions dans lesquelles la conservation, la restauration ou l'utilisation durable de la biodiversité peuvent contribuer au recul de la pauvreté. Il s'agit de :

- Mieux valoriser les savoir-faire, les ressources génétiques et les services délivrés par la biodiversité
- Concevoir la transition de systèmes dégradés à des systèmes plus biodivers comme un facteur de développement économique et social
- Intégrer des mesures en faveur de la biodiversité dans les politiques de lutte contre les inégalités
- Apporter une expertise aux institutions collectives et aux pratiques de gestion environnementale concernées

4) Biodiversité, transformation agroalimentaire et nutrition

L'utilisation de variétés et d'espèces locales de fruits, légumes ou microorganismes peut résoudre des déséquilibres alimentaires et contribuer à la lutte contre la malnutrition, au-delà du simple apport calorique des rations.

Les travaux du Cirad sur les régimes alimentaires durables ont pour objet de:

- Caractériser, valoriser et préserver les propriétés nutritionnelles, organoleptiques et fonctionnelles des ressources et des produits locaux
- Améliorer la qualité nutritionnelle des aliments, notamment par des processus fermentaires utilisant la diversité microbienne locale

Enfin, par son mandat de recherche en coopération et sa vocation internationale de développement, le Cirad œuvre pour des collaborations irréprochables et équitables. De manière pionnière au niveau français, le Cirad s'est donc doté très tôt d'un code de conduite relatif au transfert des ressources génétiques (publié en 2001 et révisé en 2011) afin de fournir un appui pratique aux chercheurs pour faciliter leur compréhension et application des règles et des questions complexes qui se posent lors de tout transfert de matériel biologique. Le Cirad a également développé un outil logiciel d'aide à la détermination du statut des ressources génétiques et du type d'accord de transfert de matériel biologique (MTA) adapté à ce statut (Géné-PI). En 2007, à la demande du Secrétariat du TIRPAA, une adaptation à la mise en œuvre du Traité international sur les ressources phytogénétiques pour l'alimentation et l'agriculture de ce logiciel a été réalisée (Gene-IT). Le Cirad met également son expérience dans ce domaine pour venir en appui aux réflexions sur l'accès et le partage des avantages pour les ressources génétiques pour l'alimentation et l'agriculture (RGAA), en particulier sur le Projet d'éléments visant à faciliter la mise en œuvre des principes d'accès et de partage des avantages pour différents sous-secteurs des RGAA au niveau national.

3. GLOBAL FORUM ON AGRICULTURAL RESEARCH (GFAR)

Farmers Rights in Practice: The Commission and GFAR

Farmers' Rights, meaning the rights of smallholder and family farmers to save, use exchange and sell farm-saved seeds and propagating material; protect their traditional knowledge, innovations and practices; participate in decision-making and benefit from the use of seeds and associated knowledge are crucial for the conservation and sustainable use of plant genetic resources, the raw material indispensable for crop genetic improvement, food and nutrition security. The recognition and implementation of Farmers' Rights would also lead to the co-existence and mutual support of the formal and informal seed sectors: Farmers' Rights and Breeders' Rights.

The Commission on Genetic Resources in Food and Agriculture recently signed a Memorandum of Agreement with the Global Forum on Agricultural Research (GFAR)⁶, to work together in promoting the cause and implementation of Farmers' Rights in practice. GFAR is also recognized by the Governing Body of the [International Treaty on Plant Genetic Resources for Food and Agriculture](#), as a key mechanism to foster multi-stakeholder inclusion in the practical implementation of Farmers' Rights provisions of the Treaty. The Treaty, with 132 Contracting Parties, recognizes Farmers' Rights, but the realization of those rights is left to national governments and has so far had limited uptake. Often farmers themselves do not know that these rights even exist, let alone that their country is a signatory to the Treaty.

Farmers' Rights were formulated as a counterbalance to the recognition in 1961 by the international community of rights to breeders over new varieties of plants. Breeders' Rights imply that the breeder has the right to authorize actions taken by others on the new variety, including selling and marketing, importing and exporting, keeping stock and reproducing it. On the other hand, the rights of farmers over plant genetic resources, used as raw materials for further innovations and the development of new plant varieties, were not recognized by the international community until 2001.

The difference between plant genetic resources and other natural resources is the human element. Without people, the seeds that feed the world would not exist. Because ownership of the genetics nurtured by the smallholder farmer is collective, it is difficult to measure their rights in monetary terms. Yet, potentially, they are a much-needed source of income and of recognition of the status and value of farmers as innovators themselves.

GFAR actively engaged partners in the original formulation of the Treaty and its requirements. More recently, GFAR commissioned an [expert review of how Breeders Rights and Farmers Rights could be reconciled in the context of international agricultural research](#). This review has been very influential in the implementation of new Intellectual Assets Principles in the work of CGIAR and has triggered huge demand from national systems for similar support, in putting Farmers' Rights provisions into practice.

GFAR is now actively supporting the implementation of Farmers' Rights at local and national levels and into international policies. Technical and legal support is already being provided to the Central America and Southern Africa regions (Guatemala, Nicaragua, Honduras and Malawi); and soon will be offered to other countries and regions in the Near East, Asia, Latin America and Sub-Saharan Africa.

When farmers' organizations in Guatemala were asked what they most needed in order to exercise their rights, the answer was resounding: they needed locally relevant information about their rights. GFAR is therefore working, with the Commission and Treaty, to bring that information to both farmers and governments.

GFAR has organized numerous meetings with multiple stakeholders, particularly farmer organizations, and from that experience has produced [six awareness-raising booklets](#). Decision-

⁶ CGRFA-15/15/Inf. 34

makers have been engaged in the Guatemalan Government, as governments are also seeking support. Support has included drawing up key steps that governments should follow in order to develop national legislation on farmers' rights. Next, these findings from the Guatemala experience will be introduced into Honduras, Nicaragua and Malawi.

Translating farmers' rights from theory into practice is not straightforward. From observations to date, however, we have identified 3 key areas for action:

1. Communication via a process that is inclusive and participatory. Meetings and information flow need to involve all stakeholders - smallholder farmers, public sector decision-makers and private enterprise investors. International partners like GFAR, the Commission and the Treaty can be crucial in getting this underway. Smallholder farmers, especially women farmers (often the principle holders of traditional knowledge), need to be given a voice.
2. Support to governments for the development of legislation and implementation of farmers' rights. Governments need to conceive of farmers' rights as integral to addressing other priorities e.g., climate change, so that implementation of those rights can be included under established budgets. The Commission has a very important role to play in this awareness raising.
3. Meetings and processes of the Commission, and international consultation processes like the [Global Conference on Agricultural Research for Development](#), must become venues not only for motivational communication and sharing of experiences, but also for the harnessing of political will, and for action-oriented advice that speaks directly to the situation back home, on the ground.

4. INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

Input from IAEA (through the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture)

THEME: ANIMAL GENETIC RESOURCES

Presentation of “The Second Report on the State of the World’s Animal Genetic Resources for Food and Agriculture (2007-2013)”

Animal Production and Health Sub-programme (APHS) of the Joint FAO/IAEA Division supports Member States (MS) to implement the Global Plan of Action (GPA) on Animal Genetic Resources (AnGR) through development and transfer of nuclear and molecular technologies for characterization of livestock, capacity building and technical support for sustainable use and development. One of the major thematic areas of the APHS is “Innovative nuclear based approaches to maintain biodiversity and enhance livestock productivity” and the activities that focussed on each of the strategic priority areas of GPA are:

Strategic Priority Area 1: Characterization, inventory and monitoring

(i) Breed characterization projects implemented in MS

(a) *Gene based technologies in livestock breeding: Characterization of small ruminant genetic resources in Asia:* the Joint Division supported phenotypic and molecular genetic characterization of 49 sheep breeds and 37 goat breeds from eleven countries (Bangladesh, China, Indonesia, Iran, Pakistan, Sri Lanka, Vietnam, Bulgaria, Peru, India and Burkina Faso).

(b) *Genetic variation on the control of resistance to infectious diseases in small ruminants for improving productivity:* the Joint Division is currently supporting characterization of 13 indigenous sheep breeds and 11 goat breeds for phenotypes related to host resistance against gastrointestinal parasites. Twelve countries (Argentina, Bangladesh, Brazil, Burkina Faso, China, Indonesia, Ethiopia, Iran, Nigeria, Pakistan, Saudi Arabia, Sri Lanka) are presently involved in the project.

(c) *Technical Cooperation Projects:* Under IAEA's Regional and National Technical Cooperation (TC) Projects, 23 countries (Myanmar, Madagascar, Zambia, Angola, Iraq, Jordan, Burkina Faso, Syria, Yemen, Oman, Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Hungary, Kazakhstan, Macedonia, Montenegro, Romania, Serbia and Turkey) were supported to characterize indigenous livestock and poultry populations. Under these projects, genetic characterization of 9 native cattle breeds and 17 chicken populations were completed.

(ii) Development of methods/ protocols for phenotypic or molecular characterization

(a) The Joint Division identified suitable phenotypes and developed protocols for characterization of sheep and goat breeds to assess their genetic resistance against gastrointestinal parasites.

(b) **Radiation Hybrid Panels** were developed for mapping goat genome.

(c) More than 400 DNA (Single Nucleotide Polymorphism-SNP) markers were discovered in sheep, goats and chicken and genotyping protocols were developed to assess local breeds for disease resistance.

Strategic Priority Area 2: Sustainable Use and Development

(i) The Joint FAO/IAEA Division supported at least six MS (Madagascar, Myanmar, Zambia, Burkina Faso, Sierra Leone and Chad) in formulating and implementing strategic breeding programs to improve 11 indigenous cattle breeds for milk, meat and draught purposes. An electronic animal identification system has been introduced and technical support was provided to initiate performance recording in selected animals.

(ii) The Joint Division facilitated interaction of stakeholders within countries like livestock departments, breeding organizations and institutional laboratories, especially targeting the value chain on delivery of animal breeding services to farmers. Nuclear techniques like **radioimmunoassay** were utilized to deliver efficient and improved quality artificial insemination (AI) services and increase farmers' accessibility to superior germplasm.

(iii) The Joint Division supported national efforts to conserve indigenous production systems and improve animal breeding activities in pastoralist communities. Some of the examples include (a) Improving livestock among Maasai tribes in Ngorongoro Conservation area in Tanzania (b) Training on AI in yaks maintained under nomadic and semi-nomadic pastoral system in Mongolia (c) Training on AI in cattle maintained by Fulani tribes in Sierra Leone

Strategic Priority Area 3: Conservation

Animal Production and Health Laboratory (APHL) of the Joint FAO/IAEA Division is maintaining a repository of genetic material (DNA) from indigenous livestock breeds. At present, about 3000 DNA samples collected from more than 70 breeds of various animal species including cattle, sheep, goat, chicken, Alpaca and pig are maintained in cold storage.

Strategic Priority Area 4: Policies, Institutions and Capacity-building

(i) Implementation of training or capacity-building programmes

The Joint Division conducted group training and individual fellowship training courses on genetic characterization of AnGR and bioinformatics analysis of genetic data. A total of 57 participants were trained through 1-2 weeks of group training courses. Eleven participants were provided individual fellowship training for the duration of 2-3 months at Animal Production and Health Laboratory (APHL), Seibersdorf. Six regional and four national training courses were conducted in eight countries (Sudan, Egypt, Botswana, Tunisia, Eritrea, Madagascar, Sierra Leone and Zambia) to build capacity on data collection and AI services.

(ii) Database or information system for animal genetic resources

The Joint Division is currently establishing APHL - Animal Genetics Reference Material Database with information on genetic repository, DNA marker tools, radiation hybrid panels for mapping livestock genomes, resources related to AnGR characterization, protocols and SOPs.

(iii) Establishing or strengthening international collaboration

The Joint Division established a network of genetic laboratories from various member states through its Coordinated Research Projects, Regional and National Technical Cooperation Projects to facilitate and strengthen international collaborations especially in the areas of molecular characterization and genetic improvement of livestock breeds, artificial insemination services including semen collection, freezing and distribution.

(iv) Funding to countries for the implementation of GPA-AnGR

During the period 2007-2013, the Joint Division provided partial or complete financial support to at least 39 countries for the evaluation, characterization and sustainable utilization of animal genetic resources through (1) Research contracts under coordinated research projects (2) Regional Technical Cooperation Projects (3) National Technical Cooperation Projects.

THEME: PLANT GENETIC RESOURCES

Plant Breeding and Genetics Sub-programme (PBGS) of the Joint FAO/IAEA Division supports Member States (MS) in activities that focus on strategic priority areas of GPA, as follows:

Focus Priority Activity 9 of the Second Global Plan of Action: *Supporting plant breeding, genetic enhancement and base-broadening efforts.*

In 2013 the Joint Division supported national and regional plant breeding programs through 72 IAEA Technical cooperation projects (25 national and regional projects in Asia and the Pacific, 32 national and regional in Africa, 6 national and regional in Europe and Central Asia, 7 national and regional in Latin America and the Caribbean, and 1 interregional) and 6 Coordinated Research Projects (R&D networks) in close to 100 Member States. The support encompasses adaptive R&D, technical and scientific guidance and support, infrastructure building, capacity development and irradiation service. A total of 232 people were trained (thereof 112 in the Plant Breeding and Genetics Laboratory). 11 training courses and workshops were organized world-wide.

The FAO/IAEA Plant Breeding and Genetics Laboratory (PBGL) is an integral part of the Joint Division and aims to support methods in creating novel biodiversity for use in crop improvement in Member States. This is achieved through adaptive R&D activities in mutation induction and mutation detection. The technologies developed are transferred to Member States through training programmes, dissemination of manuals, protocols and guidelines and the provision of irradiation services for mutation induction. A major challenge is to 'weatherproof' existing crop production systems and increase their resilience to climate change. In order to make better use of both productive and marginal lands, it is essential to select, evaluate and develop crop genotypes that can flourish under harsh conditions.

The Joint Division through FAO and IAEA activities develops Member States' capacities to incorporate useful mutants in breeding programmes, including breeding programmes in which the farmers participate in order to ensure acceptance and facilitate the release of new varieties. Local crop production systems are often based on orphan/neglected/underutilized crops, which are a diverse set of plant species of local or even regional importance or indigenous landraces of fruits and vegetables. These crops tend to be critical for food security for a significant number of poor farmers in developing countries by providing needed calories and nutrients. The Joint Division through the Agency's activities assists in generating induced mutants in a range of orphan crops using *in vitro* and *in vivo* techniques coupled to mutation induction, allowing for selection and evaluation of new genotypes for breeding. Many of these orphan crops are not grown on a large scale because they lack domestication traits. Domestication traits have been part of the evolution of all crop species, for some these traits have arisen by selection of spontaneous (natural) mutations, but can be sped up through induced mutation.

The Joint Division is also receiving increasing numbers of requests from Member States for technical support on genetic characterization of PGRFA with expressed interests on high throughput mutation screening using reverse genetics methodologies. With the availability of additional resources, it will be possible to meet the requirements of Member States especially in terms of laboratory reagents and training personnel on advanced DNA methodologies for evaluation, characterization, conservation and sustainable utilization of PGRFA.

Priority Activity 10 of the Second Global Plan of Action: *Promoting diversification of crop production and broadening crop diversity for sustainable agriculture.*

Concerning biodiversity, mutation induction is the tool of choice to broaden the adaptability of food crops to dynamic agro-ecologies, to improve resource use efficiency and to foster the application of mutant varieties in local crop production in developing Member States, thus contributing to sustainable food security. The mandate of the Joint Division in the field of breeding is mutation induction. Mutation induction coupled with selection remains the "cleanest" and most inexpensive way to create biodiversity (genetic variation) and to develop crop varieties by changing single characters, and importantly, without affecting the overall phenotype favoured by local communities and other end users. There is no linkage drag involved, which would be the case if the desired variation is introgressed from another genotype, this is particularly problematic if the source of the desired variation is only

available in the secondary or tertiary gene pools related to the crop. Mutation breeding is tested, proven, robust, cost effective, non-hazardous, quick and environmentally friendly. It is ubiquitously applicable and transferrable. Breeders use mutation induction to broaden the genetic base of germplasm, and use the mutant lines directly as new varieties or as sources of new variation in breeding programmes.

Priority Activity 15 of the Second Global Plan of Action: *Constructing and strengthening comprehensive information systems for plant genetic resources for food and agriculture.*

The Joint Division maintains, updates and develops the Joint FAO/IAEA Mutant Varieties Database, currently harbouring information on more than 3200 officially or commercially released mutant varieties from more than 200 plant species world-wide.

5. INTERNATIONAL CENTRE OF INSECT PHYSIOLOGY AND ECOLOGY (*icipe*)

The African ecosystem is facing major challenges through loss of habitat, as well as plant and animal biodiversity that provide crucial ecosystem services such as nutrient cycling, climate and disease regulation, pest management carbon sequestration and pollination. To address these threats, *icipe* has established programmes that seek to enhance food and nutritional security, health and incomes of people in Africa through research and development that links biodiversity and its conservation with ecological functions and sustainable utilization of resources and at the same time addressing climate change mitigation and adaptation strategies. These R&D projects being undertaken by *icipe* thus cut across FAO commissions' prioritized themes of animal, forest and plant genetic resources and also use of microorganisms and invertebrates as important biological control agents. *icipe* has also been at the forefront of launching a programme to exploit insects, which are an abundant mini-livestock resource as a source of nutrition for humans and animal diets, with low carbon footprint and environmental impact.

Below is a summary of the *icipe*'s contribution on the prioritized themes of the FAO Commission on Genetic Resources for Food and Agriculture.

1. ANIMAL GENETIC RESOURCES

- i) Characterization of the edible insect species in Africa through combination of molecular systematics and socioeconomic inventory
- ii) Development and dissemination of technologies for production, processing and marketing of insect-based foods and feeds
- iii) Supporting policy-making for utilization of the edible insect resource through provision of evidence-based knowledge and enabling stakeholder consultations
- iv) Strengthening and supporting national and regional capacity for sustainable utilization of edible insect resources and
- v) Promotion of information exchange and knowledge sharing for research and development on insects for food and feed.

2. FOREST AND PLANT GENETIC RESOURCES

- i) Promotion of a shift to Green Jobs, such as insect-based enterprises, which help protect and restore forest genetic resources through controlled and commercialized harvesting of non-timber forests products for nutrition (edible insects), health (e.g. low-cost nature-based repellents) and income (apiculture & silk).
- ii) Reduction of vulnerability to climate change through applied research, capacity-building and technology transfer to manage invasive species and expanding ecosystem range of pests and pathogens.
- iii) Assessment of the impacts of climate change on phenology of forest species which may lead to a loss of synchrony between species; changes in species abundance and distribution; changes in the composition of communities and changes in the ecosystem processes.
- iv) Detection of land use/land cover changes (forested area, composition, habitat suitability) using Earth Observation technologies, such as satellite imagery.
- v) Encourage reforestation with indigenous species to support biodiversity and provision of habitats for useful arthropods. On-farm management of FGR for functional agro-ecology; hosts for parasitoids and natural enemies for biological control of insect pests. Improved carbon sequestration on the farms through agro-forestry and conservation agriculture. Ecosystem-based adaptation through landscapes approach (integrated planning, management and conservation of genetic resources across the different land use types).

- vi) Cataloguing biodiversity and understanding how arthropod agrobiodiversity and wild habitats support agricultural production and human health through ecosystem services, and quantifying those benefits.
- vii) Establishing modern apiculture and sericulture practices as significant contributors to rural livelihoods and pollination services.
- viii) Promoting conservation of pollinators' biodiversity among rural communities for food security and environmental protection.
- ix) Developing new natural products from plants and insects for the benefit of natural resource-dependent rural communities and consumers.
- x) Generating information on the impact of climate change on ecosystem services and food security.
- xi) Exploration of low carbon development opportunities through applied bioprospecting.

3. MICRO-ORGANISMS AND INVERTEBRATES

Microorganisms, especially entomopathogens (fungi, bacteria, viruses and protozoa) are potentially important biological control agents and are being developed as microbial insecticides jointly with the private sector. In order to fulfill its mandate of research on environmental-friendly and sustainable strategies for the management of arthropod crop pests and disease vectors, icipe has established an Arthropod Germplasm Centre to act as a repository of arthropod pathogens and develop the necessary capacity for their utilization in pest and vector control programs. The activities of the Arthropod Germplasm Centre include isolation, culture, identification, and preservation of samples from Africa and elsewhere, conducts training of staff from various institutions. Pathogens are made available upon request to investigators in other institutions.

The intellectual property rights of contributors to the Germplasm Centre are safeguarded by the ICIPE policy on Intellectual Property Rights (2002) that was developed to be in compliance with Convention on Biological Diversity (CBD), the International Undertaking on Plant Genetic Resources for Food and Agriculture, the World Intellectual Property Organization, and the United Nations sub-Commission on Human Rights. The operational authorization for a Germplasm Centre has received approval by the Kenya Government's Standing Technical Committee on Imports and Exports (KSTCIE) (May 2002) and granted permission to import and curate exotic insect pathogens.

6. SEARICE

SEARICE Work on PGRFA

SEARICE pushes for its twin programmes of PGRFA Conservation and Sustainable Use (CSU) and empowerment among small farming families across Asia, particularly in Bhutan, Cambodia, Laos, Philippines, Thailand, and Vietnam and very recently, Timor Leste. In its work, SEARICE is guided by people-based policies that involve a rights-based, participatory, comprehensive and results-based approach to blend farmers' knowledge and appropriate science-based breeding and agricultural techniques.

Engaging with farmers

Through field schools and other activities, SEARICE farmer-partners have been producing new varieties according to their preferred traits and management options. These farmer-bred varieties are resistant to pests and diseases, do not depend on chemical inputs and have shorter maturity periods – characteristics that lower production costs and increase productivity.

At the end of 2010, a total of 1,224 rice varieties were rehabilitated and developed across the five program countries of SEARICE. These varieties are reliable, having been tried and tested in the farmers' own farms and are made available even to farming communities not covered by the program. The on-farm seed conservation and development caused behavior modification in favor of the environment as farmers practiced ecological methods which gave their lands a breather and cut production expenses. Diversified farming, i.e. maximizing the use of the land by adding several components such as cash crops, animals, etc., provided additional income and sources of food thereby bolstering farmers' food security.

Moreover, SEARICE encourage farmers to organize themselves. Seed clubs and farmer-plant breeders associations sprouted after FFS sessions. SEARICE has worked with close to 800 communities and more than 24,000 farmers.

Participatory plant breeding

Participatory plant breeding resulted to new farmer-bred varieties that are adaptable to local conditions. As of 2011 in Vietnam, four farmer-bred rice varieties have shown to be well adapted to acid-sulfate soil. Eight farmer-bred varieties thrive in acidic soil, and seven varieties are doing well in saline soils. In other countries, there are farmer-bred varieties that are tolerant to drought and flood conditions, suitable for organic farming systems, resistant to specific pests. This demonstrates that the capacity of farmers to develop varieties that are adapted to specific local needs and the conditions of ecological micro-niches is essential for making rural communities resilient against the impacts of climate change.

All throughout the SEARICE project areas, activities are focused on the conservation and rehabilitation or purification of some local and stable varieties that are proven to be adaptable to adverse environmental conditions. This includes i.e. a native local variety such as Chiem Huong adapted to Yen Bai upland and cold conditions. Also, through the FFS, farmers have learned and appreciated the significance of conserving traditional or local varieties and using these as breeding or parent materials for improving or developing new varieties that can adapt to vulnerabilities to climate change.

The ability of seed systems to respond to devastating calamities was tested when farmer-partners provided the needed volume of seeds needed in Thailand in 2007 and Laos in 2008 to replace crops damaged by strong typhoons in these two countries. When Nan, Thailand experienced its worst flooding, SEARICE farmer-partners were instrumental in providing seed to affected farmers in the middle of the cropping season of 2007. And when Laos was hit by a typhoon in 2008, 65,000 hectares of cultivated land were flooded, including 51,900 hectares of lowland rice area. To assist affected farmers in five provinces, the government purchased 30,500 kilograms of seeds from SEARICE project partners.

Capacity Building and Bridging with Policymakers

Activities continue for the adoption of participatory plant breeding as part of local government programs in the partner countries. SEARICE conducts capacity building activities with

government employed agricultural technicians and extension agents. These capacity building activities served as medium to enhance awareness and better appreciation of PGRFA-CSU, prompting partner Governments to continue involvement in the program, especially in monitoring and providing technical, material and financial support, and subsequent institutionalization and integration of participatory PGRFA-CSU into mainstream development programs.

In Bhutan, it is not only in research and extension where transformation is observed but in the higher level of government bureaucracy, particularly at the level of policy making. Farmers are given due consideration and specific importance in national policies and programs that affect them. For instance, the Access and Benefit Sharing Policy of Bhutan, currently in the finalization stage, is touted by many as a good model especially for developing countries. It is also in Bhutan where one can find in the National Genebank the name of farmers as part of the passport data of each and every collection, a demonstration of the importance given to farmers who are the sources of such collections.

In the case of Laos, a number of government programs initiated recently are using SEARICE project as a template for implementation, where farmers are engaged actively as partners on seed conservation and development.

7. SLOW FOOD

Slow Food is...

...a network of members

Slow Food is an **international association** founded in 1989 to recognize the importance of pleasure connected to food through the discovery of producers' knowledge, awareness of diversity (places, recipes, flavors) and respect for the territory, the environment and the seasons. Slow Food currently involves millions of people in over **150 countries** around the world. The network of members is organized into **convivia**, local groups coordinated by a convivium leader. They organize many events - courses, tastings, educational activities, dinners, events, trips - and campaign locally on Slow Food issues.

> Discover Slow Food's activities: www.slowfood.com

... biodiversity protection

In order to safeguard food biodiversity, strengthen local communities and push for a more sustainable model of agriculture, Slow Food, through the **Slow Food Foundation**, coordinates and promotes a number of projects that support **small-scale food producers**, like the Ark of Taste, the Presidia, A Thousand Gardens in Africa, Earth Markets and the Slow Food Chefs' Alliance, linking chefs, Presidia and small-scale producers.

> Discover the Slow Food Foundation's activities and projects: www.slowfoodfoundation.org

... food and taste education

Education is fundamental to Slow Food's strategies. To Slow Food, educating means promoting the **pleasure of food**, awareness in purchasing choices, **respect for nature and the seasons** and an understanding of producers' importance and knowledge to children, young people and adults. With the Master of Food, Taste Workshops, school food gardens, campaigns, conferences and seminars, Slow Food is bringing the public closer to food and taste education. The **University of Gastronomic Sciences** (www.unisg.it) in Pollenzo, in Piedmont, promotes food culture through different academic programs that engage with Slow Food's activities throughout the world through thematic and regional study trips.

> Discover Slow Food's education projects: www.slowfood.com/education

... Terra Madre

Terra Madre is a **global network** bringing together all those who preserve and encourage methods of fishing, farming and food production that are sustainable and in harmony with nature, the landscape and tradition. The first nodes of this network were the **food communities**, who have since been joined by **chefs, academics and young people**.

Since 2004, the global network has been meeting regularly on every continent in the world, giving farmers, academics, chefs, animal breeders, fishers, cheesemakers and representatives from NGOs the chance to share their knowledge and experiences.

> Discover the food communities and network events in your region: www.terramadre.org

Defend Food Biodiversity

Slow Food has always been characterized by an interest in local territories and cultures, and by the desire to spread food culture and the right to the pleasure of taste among the largest possible number of people. Thanks to this approach, Slow Food saw the effects of globalization on the variety, quality and taste of our daily food before many others. Its attention thus shifted from the dining table to the products themselves, based on the understanding that a deeper knowledge of food and production allows for a better understanding of the importance and urgency of safeguarding biodiversity and promoting the work of those who protect it. This shift was fundamental to the history of the whole association.

Slow Food has been officially working on agrobiodiversity since 1997, and the Slow Food Foundation for Biodiversity was founded in 2003. Food is the starting point and remains the guiding thread and the destination for all successive actions, allowing the union of issues that are normally studied and managed by specialized sectors, whether environmental, agricultural, social, cultural or economic. This strategy strongly characterizes Slow Food's work on biodiversity, which starts from the safeguarding of genetic resources, but also takes into account traditional knowledge and farming and food processing techniques, ecosystems (the relationship between varieties and breeds to their territory, their adaptation to climates, soils and altitudes) and local cultures (languages, dialects, rituals, crafts, architecture), while never overlooking the sensory approach and the attention to taste.

Within this framework, the effort to safeguard biodiversity also requires the promotion of food products such as breads, cheeses, cured meats and so on. These products, the valuable heritage of local communities, were originally invented to preserve raw ingredients like milk, meat and vegetables and are the result of knowledge passed down from generation to generation. Artisanal processing methods are the basis of unique products which are an expression of local cultures and which free producers from seasonal cycles and market fluctuations. It is often possible to safeguard local ecotypes and breeds by creating a range of processed products to sell alongside the unprocessed foods.

Today, through the Slow Food Foundation, Slow Food runs a number of projects to protect biodiversity (Ark of Taste, Presidia, Earth Markets, community and school food gardens, the Alliance Between Chefs and Slow Food Presidia), supporting the work of small-scale food producers and spreading awareness around the world of the value of biodiversity.

Our main activities in this area are:

Ark of Taste

The Ark of Taste selects and catalogs quality food products at risk of extinction from around the world. Thanks to the work of members and experts, joined in 23 national commissions, over 1,500 products in 59 countries have been recorded, with descriptions published in Italian and English on the Slow Food Foundation website.

Presidia

The Presidia support traditional small-scale products at risk of disappearing, promote local areas, revive ancient crafts and production techniques and save native breeds and fruit and vegetable varieties from extinction. Currently there are more than 400 Presidia in over 50 countries around the world.

A Thousand Gardens in Africa

Thanks to massive international mobilization, between 2010 and 2012 Slow Food created a thousand school, community and urban food gardens in 25 African countries. The project was relaunched in 2014 with a new objective: creating 10,000 food gardens and at the same time establishing a network of young African leaders who can work to save Africa's extraordinary biodiversity, raise awareness about traditional knowledge and gastronomy and promote small-scale and family farming.

Earth Markets

Earth Markets are for small-scale producers who only sell what they have produced themselves. The products are local, seasonal, made using sustainable and environmentally friendly methods and sold at fair prices. The Slow Food Foundation assists Slow Food convivia in the various planning stages— drawing up rules, selecting producers, communication—and promotes the creation of new Earth Markets in the Global South. Currently there are 38 markets in 11 countries.

Other activities:

The **narrative label** is a supplementary label for food products, designed by producers in collaboration with the Slow Food Foundation, which provides detailed information about

producers, their business, the plant varieties or animal breeds used, farming and processing techniques, animal welfare, the place of origin, and more. A large number of Presidia have already adopted this label.

The Slow Food Foundation works with chefs and consumers around the world to spread awareness about the value of biodiversity and to promote quality artisanal products. In 2013 the **Slow Food Chefs' Alliance** linking chefs and Presidia, started in Italy, was also launched in the Netherlands and Morocco, and evolved further to include food communities and other local producers.

The Ark of Taste

Created in 1996, the Ark of Taste is Slow Food's most important project for cataloguing food biodiversity at risk of extinction. The Ark welcomes plant and animal species on board, as well as food products (breads, cheeses, cured meats, etc.), because Slow Food occupies itself primarily with the people who grow, raise or process the products, their knowledge and their local areas.

The Ark represents a phase of research and reporting. After the initial cataloguing, an essential starting point, Slow Food develops various strategies to support "good, clean and fair" producers, primarily through the Presidia (the natural evolution of the Ark project) but also indirectly with various other types of initiatives (Earth Markets, events and festivals dedicated to small-scale products, the publication of guides).

Every product - fruits, vegetables, animal breeds, cheeses, breads, sweets, cured meats, etc. - is nominated thanks to the research conducted by people around the world, who collect testimonies from their community and compile a nomination form, downloadable from the Slow Food Foundation for Biodiversity website. The nomination is sent to a national commission (a scientific commission of agronomists, veterinarians, cooks, rural historians and other experts), where one exists, or directly to the Slow Food Foundation offices.

Ultimately a description of the product is included in a catalogue, accessible from the Slow Food Foundation website.

To identify products, there are national Ark commissions in 23 countries: Argentina, Australia, Austria, Brazil, Bulgaria, Canada, Chile, Cuba, Ecuador, France, Germany, Ireland, Italy, Japan, Mexico, the Netherlands, Norway, Romania, South Korea, Sweden, Switzerland, the United Kingdom and the United States. The national commissions work in their respective countries to monitor at-risk products, identify new nominations, locally promote the Ark's passengers and organize awareness-raising and educational initiatives around the issue of biodiversity defense.

The **23 national commissions**, the International Commission and the Slow Food convivia are working with dedication and passion to discover unique products from all over the world which are treasures of local culture threatened by industrial agriculture and standardization.

Presidia

The Presidia are projects established to save artisanal food products, native animal breeds, plant varieties, traditional farming and fishing techniques, ecosystems and rural landscapes at risk of extinction. They involve communities of small-scale producers who are willing to collaborate and jointly establish production rules and ways of promoting their product. They preserve ancient knowledge, encourage sustainable practices and promote local areas.

The Presidia are concrete and virtuous examples of sustainable agriculture, based on quality, animal welfare, sustainability, connection to a local area and consumer health and pleasure.

Slow Food assists the producers by organizing trainings and exchanges of experiences, promotes products by communicating their stories (the stories of producers, knowledge, local areas and production methods) and uses the association's network to link producers with consumers through events, the involvement of chefs and support for forms of direct sale such as farmers' markets and purchasing groups.

The Presidia project was started in 1999. After cataloguing hundreds of products at risk of extinction through the Ark of Taste, Slow Food decided to take a further step and engage

concretely with the world of production, getting to know the places, meet the producers and promote their products, work and wisdom. Over the years, the Presidia project has become one of the most effective tools for putting into practice and exemplifying Slow Food's policies on agriculture and biodiversity. In 2008, nine years after the project was started, Italian producers asked Slow Food Italy for a brand to use on their labels to identify, protect and promote the products. It would allow consumers to identify genuine Presidia products, protecting them from the increasing numbers of imitations on the market. Slow Food Italy registered the "Presidio Slow Food" brand, designing a new logo (different from Slow Food's snail symbol) and drafting a series of regulations. Only producers who have signed the regulations and the code of use, stating that they will respect their Presidium's protocol, are allowed to use the logo. As of 2012, the 22 Swiss Presidia are also allowed to use the "Presidio Slow Food" brand.

A Thousand Gardens in Africa

In 2010 Slow Food embarked on an ambitious project to create 'good, clean and fair' food gardens in every Terra Madre community across Africa, assisting them in their work to cultivate more sustainable and healthy regions. The challenge to create one thousand gardens in schools, villages and on the outskirts of cities was launched at Terra Madre – World Meeting of Food Communities in October 2010.

About a third of the gardens are in schools, serving as open-air classrooms and often providing fresh vegetables for school meals. The others are family or community gardens. All together, they involve over 50,000 people, between farmers, agronomists, students and teachers.

The gardens project has strengthened Slow Food's African network. What's more, food communities have been started, many local products in need of safeguarding have been identified and new Presidia have been established. This new context has made it possible to relaunch the campaign, moving from a goal of 1,000 gardens to a campaign to create 10,000.

Behind this extra zero lies a political proposal. **Creating 10,000 food gardens** means having, by 2016, a network of young African leaders who will guide the policies, strategies and operations of the Slow Food movement in Africa and who will work to save biodiversity, promote sustainable agriculture, raise the profile of local products and African gastronomy and make citizens and politicians aware of major themes like GMOs, land grabbing and the devastating impact of monocultures.

The project's new phase was officially presented at the Auditorium San Fedele in Milan on February 17, 2014, during the event "Slow Food for Africa." In addition to Slow Food's President, Carlo Petrini, the FAO Director-General, José Graziano Da Silva, and the mayor of Milan, Giuliano Pisapia, also speaking at the event were five African representatives from the network, who talked to an audience of 450, including journalists, entrepreneurs, actors, directors and many of the Slow Food convivium leaders and members who have supported the project over the years.

Earth Markets

In 2008, Slow Food began working on **Earth Markets**, a project aimed at developing a network of farmers' markets where producers can sell their products directly to consumers, bringing the soil and the table closer together.

The Earth Markets are farmers' markets created according to guidelines that follow the Slow Food philosophy. The markets are managed collectively and serve as meeting places where local producers can present quality products directly to consumers, selling them at fair prices and guaranteeing environmentally sustainable production methods. The markets also preserve the food culture of local communities and help to protect biodiversity. From a technical perspective, the project is overseen by the Slow Food Foundation for Biodiversity, which develops regulations and tools for organization and communication, as well as supports the creation of Earth Markets at the international level.

Earth Market candidates are visited by the Slow Food Foundation, the regional coordinator from Slow Food International and the local convivium leader or other local contact. The market then

presents a formal request to enter the international Earth Market network, including its own proposed regulations, which are adapted to each context and culture. Formal approval by the Slow Food Foundation means the market joins the network and uses the Earth Market brand.

8. THIRD WORLD NETWORK

Third World Network's biosafety programme is mainly focused on the impacts of modern biotechnology or genetic engineering. While there are many useful applications of biotechnology for the conservation and sustainable utilization of genetic resources for food and agriculture, the risks posed by modern biotechnology to genetic resources for food and agriculture must be, equally, seriously addressed.

TWN's biosafety activities include:

1. Biosafety capacity building, in particular of developing country policy makers, regulators and officials, scientists, and NGOs.

There is a great need to strengthen knowledge of and capacity on biosafety, particularly scientific knowledge and capacity. In developing countries, many lack the capacity to monitor research and development activities and trends, conduct risk assessments and holistically examine the full health, environmental and socio-economic implications of genetic engineering and genetically modified organisms (GMOs). This is necessary in order to develop appropriate approaches, laws and policies to deal with the challenges, including risks to genetic resources for food and agriculture.

TWN together with its scientific partners - GenØk-Centre for Biosafety, Norway, and INBI-Centre for Integrated Research in Biosafety, New Zealand have organised international biosafety training courses for mainly developing country participants. A total of 10 international courses were held from 2003 to 2012, training more than 400 participants. Regional courses have also been organized since 2006 in South East Asia, Latin America, Southern Africa, East Africa, West Africa, South Asia and Eastern Europe.

In addition, TWN also conducts national and regional workshops, responding to needs and requests from NGOs and governments in developing countries.

2. Active involvement with the work of the Cartagena Protocol on Biosafety, which aims for an adequate level of protection from living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health.

TWN actively participates at the meetings of the Conference of the Parties serving as the Meeting of the Parties (COP-MOP) to the Cartagena Protocol on Biosafety, and as an expert in expert group and other meetings of the Cartagena Protocol on Biosafety during the inter-sessional period between the COP-MOPs.

Recently, these include the Ad Hoc Technical Expert Group (AHTEG) on socioeconomic considerations, and the Ad Hoc Technical Expert Group on risk assessment. The Parties to the Cartagena Protocol on Biosafety decided to established these AHTEGs to undertake further guidance on risk assessment of GMOs and on socioeconomic considerations of GMOs, in order to assist Parties in their implementation of the Protocol. These elements are also critical for ensuring the further conservation and sustainable use of genetic resources for food and agriculture.

3. Biosafety information dissemination.

TWN operates a regular listserv - Biosafety Information Service, which has more than 3800 subscribers. TWN also has a dedicated biosafety website - Biosafety Information Centre (www.biosafety-info.net), which together with the Biosafety Information Service aim to:

- Increase knowledge on, and deepen understanding of, (w)holistic approaches for a comprehensive assessment of technologies and techniques that involve genetic engineering
- Contribute to a wider public discussion and critical understanding of the scientific, ecological, social, economic and ethical dimensions of genetic engineering under the rubric of biosafety
- Contribute to the enhancement of the biosafety capacity of policy makers and regulators in developing countries

- Promote research (including the identification of gaps in knowledge) on biosafety
- Promote research on, and implementation of, sustainable systems for agriculture, health and ecological integrity
- Promote understanding of, and respect for, the rights, knowledge and practices of indigenous peoples and local communities.

TWN also publishes books and papers on biosafety, in order to further disseminate biosafety information. Recent publications include:

- a) TWN Biotechnology and Biosafety No. 15 - Genetically Modified Mosquitoes: Ongoing Concerns. By Helen Wallace (English and Spanish)
- b) TWN Biotechnology and Biosafety No. 16 - Buzz or Bust for Genetically Engineered Insects? By Edward Hammond (English and Spanish)
- c) Scientific Conference 2012: Advancing the Understanding of Biosafety. GMO Risk Assessment, Independent Biosafety Research and Holistic Analysis
- d) International Conference on Biosafety: Sustainable Innovation and Regulatory Needs. Summary Report and Proceedings. Penang, Malaysia, 7-10 November 2012. Published by TWN and GenØk
- e) TWN Biosafety Briefing - Field-resistance of the African maize stem borer to Bt maize: What did we learn? By Johnnie van den Berg
- f) TWN Biosafety Briefing - Genetic Engineering and the Big Challenges for Agriculture: Lessons from the United States. By Doug Gurian-Sherman
- g) TWN Biosafety Briefing - Socio-economic Considerations in GMO Decision-making. By Georgina Catacora-Vargas

Overall, TWN wishes to echo the concerns voiced by many developing countries that are Parties to the Cartagena Protocol on Biosafety, over the risks posed by GMOs, including to genetic resources for food and agriculture. We hope FAO can work to ensure that any effort will be done to contribute to existing processes in a coherent and supportive manner, and not create parallel efforts that can exhaust limited resources.

9. UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION (UNCCD)

1) “The State of the World’s Biodiversity for Food and Agriculture: Consideration of the internalization of the ecosystem approach to biodiversity management in agriculture, forestry and fisheries”

The primary aim of the United Nations Convention to Combat Desertification (UNCCD) is “to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability” (UNCCD 10-year Strategy).

As such, the UNCCD plays an important role in reducing environmental degradation affecting dryland ecosystems, thereby contributing to the conservation of biodiversity at all levels, including genetic resources, endangered species and vulnerable ecosystems and landscapes.

Biodiversity and ecosystem conservation contributes directly to the objectives of the UNCCD by improving land productivity, while promoting the rehabilitation, conservation and sustainable management of land and water resources. This supports Article 2 of the UNCCD, which calls for improved living conditions of populations. Furthermore, such activities contribute to the implementation of the UNCCD 10-year Strategy, particularly its Strategic Objective 2 “to improve the condition of affected ecosystems” and Strategic Objective 3 “to generate global benefits through effective implementation of the UNCCD”.

Since its entry into force in 1996, the UNCCD – in close cooperation with country Parties and partners – has promoted the adoption and implementation of action programmes that address desertification, land degradation and drought (DLDD) issues at national, subregional and regional levels. In addition, the Convention has supported the development of Integrated Investment Frameworks (IIFs) and Integrated Financing Strategies (IFSs) to mobilize and allocate adequate resources to promote SLM in a holistic and coordinated manner by bringing together different sectors and stakeholders involved.

The UNCCD Scientific Conference at its 2nd session in 2013 identified the integrated economic valuation of land and ecosystem services as one of the primary vehicles to unlock currently untapped investment potential for SLM. As a follow-up, the UNCCD’s Secretariat and its Global Mechanism are promoting the Economics of Land Degradation (ELD) and Offering Sustainable Land-use Options (OSLO) initiatives and implementing valuation projects that demonstrate the financial, socio-economic and environmental benefits of responsible SLM investments at the ecosystem or landscape level.

More recently, the UN Open Working Group on SDGs has proposed a goal to “halt and reverse land degradation” and a corresponding target to “strive to achieve a land degradation neutral world”; in other words, a world where nations individually strive to achieve land degradation neutrality (LDN). The focus and aim of a LDN target is to maintain and improve the condition and productivity of land resources whereby soil, water and biodiversity are sustainably managed. The concept aims at working in tandem to stop the loss of productive land by halting negative degradation trends and rehabilitating already degraded land. This is with a view to ensuring the amount of healthy and productive land resources, necessary to support ecosystems services, remains stable or increases within a specified temporal or spatial scale.

In May 2014 – with the support of the Republic of Korea and in partnership with 15 UNCCD country Parties and sub-national regions affected by DLDD which are representative of the physical and socio-economic conditions of the five regional implementation annexes to the Convention – the UNCCD launched the LDN project “Towards achieving Land Degradation Neutrality: turning the concept into practice” in order to demonstrate how to implement the LDN concept at national and sub-national levels.

2) “Climate Change: Draft guidelines to support the integration of genetic diversity into national climate change adaptation planning”

Desertification, land degradation and drought (DLDD) are both causes and effects of climate change, highlighting the interdependency between the climate and land systems. This interdependency leads to possible vulnerabilities, since DLDD and climate issues interact and produce negative synergies, as exemplified by the occurrence of severe droughts.

At the same time however, this also leads to an important but often underestimated opportunity: to promote investments in sustainable land based systems, which are adapted to the effects of climate change and increase the resilience of local populations that depend on them.

The United Nations Convention to Combat Desertification (UNCCD) recognizes the important synergies between SLM and climate change mitigation and adaptation, which are considered a cornerstone for the implementation of the Convention, and explicitly included in the UNCCD 10-Year Strategic Plan and Framework and its expected impacts, such as:

- To reduce affected populations socio-economic and environmental vulnerability to climate change, climate variability and drought (expected impact 1.2); and
- To reduce the vulnerability of affected ecosystems to climate change, climate variability and drought (expected impact 2.2).

The UNCCD supports the creation of an enabling environment to promote solutions to combat DLDD through mutually reinforcing measures, including the synergistic implementation of action programmes developed under the UNCCD, the Convention on Biological Diversity (CBD) and the United Framework Convention on Climate Change (UNFCCC) in order to enhance the impact and efficiency of interventions.

Furthermore, the Global Mechanism of the UNCCD supports the

- The identification of innovative financing mechanisms to combat DLDD, including from financing mechanisms for climate change mitigation and adaptation;
- The identification and establishment of effective Incentive and Market-Based Mechanisms (IMBMs) for private sector engagement, scaling-up and impact maximization; and
- The mainstreaming of SLM into climate change mitigation and adaptation activities.

Agro-biodiversity, particularly in drylands is subject to an alarming rate of loss due to land and ecosystem degradation, which is amplified by climate change. This directly threatens people’s food and security especially for those that depend on small-scale agriculture. Therefore, the UNCCD promotes the synergistic implementation of the Rio Conventions in order to strengthen and up-scale climate resilience and adaptation through SLM and climate-smart agriculture.

In preparation for the 2015 Climate Summit and in the context of the post-2015 Development Agenda, the UNCCD is collaborating with other UN and multi-lateral bodies, including FAO, to demonstrate the multiple benefits of land restoration by profiling successful interventions that contribute to climate change adaptation and poverty alleviation. The pathways of action to achieve Land Degradation Neutrality (LDN), namely SLM and ecosystem restoration, are in this regard considered to be cost effective measures in combating DLDD, reducing biodiversity loss, including genetic resources, adapting to climate change and in further contributing towards ongoing climate change mitigation efforts.

The UNCCD is also currently working with its country Parties and partners to develop sound targets and indicators for LDN, which could be used by all Rio Conventions to measure progress made in achieving LDN.

10. WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO)

Animal genetic resources

In cooperation with the FAO Animal Production and Health Division, WIPO prepared a Patent Landscape Report (PLR) on Animal Genetic Resources. The PLR on Animal Genetic Resources explores the patenting activity and trends in the area of animal genetic resources and shall be presented at a Launch event during the 8th Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture that will take place in Rome from November 26 to 28, 2014.

The WIPO Secretariat has also contributed to the 2nd State of the World's Animal Genetic Resources Publication of the FAO with a textbox summarizing the key findings of the PLR on Animal Genetic Resources, and with a further contribution to Part 3, section E of the publication referring to Intellectual Property Rights (IPR).

Cross-sectorial matters

The following information on WIPO's activities related to genetic resources (GRs) is relevant to "access and benefit-sharing for genetic resources for food and agriculture: consideration of draft elements to facilitate domestic implementation of access and benefit-sharing for different subsectors of genetic resources for food and agriculture". It briefly introduces WIPO's work program on GRs, traditional knowledge (TK) and traditional cultural expressions (TCEs) and highlights some tools that have been developed by WIPO in the area of intellectual property and GRs.

WIPO has worked on the protection of TCEs (also known as "expressions of folklore") since the 1960s. This work was broadened to cover the related areas of TK and GRs in 1998. WIPO initiated a series of wide-ranging consultations with indigenous and local communities, other TK holders and bearers of TCEs, such as traditional healers, farmers and artisans, about their needs and expectations for the protection of TK and TCEs.

In October 2000, the WIPO General Assembly established the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC), and in 2009 the General Assembly agreed that the IGC undertake text-based negotiations with the objective of reaching agreement on a text of an international legal instrument (or instruments) which will ensure the effective protection TK, TCEs and GRs. IGC 26 on GRs was held from February 3 to 7, 2014. It further developed a "Consolidated Document Relating to Intellectual Property and Genetic Resources".

In particular, WIPO members are considering whether, and to what extent, the intellectual property system should be used to ensure and track compliance with access and benefit-sharing systems in national laws and other measures established pursuant to the Convention on Biological Diversity, its Nagoya Protocol and the FAO Plant Treaty. One of the options under discussion is to develop mandatory disclosure requirements that would require patent applicants to show the source or origin of genetic resources, and also possibly evidence of prior informed consent and a benefit-sharing agreement. Another key issue is that of the defensive protection of genetic resources, so as to prevent patents, which do not fulfill patentability requirements of novelty and inventiveness, from being granted over genetic resources, and associated traditional knowledge. Defensive protection measures could include, for example, the creation of databases on genetic resources and traditional knowledge to help patent examiners find relevant prior art and avoid the grant of erroneous patents.

Over the years, WIPO has developed a number of useful tools in the area of intellectual property and GRs. They include:

- a) An on-line, publicly accessible and searchable database of biodiversity-related access and benefit-sharing contracts with a particular emphasis on the intellectual property aspects of such agreements. The database provides information on the general approach taken in concluding relevant agreements, and stimulates the flow of information in this important area, rather than to serve as a database of legal texts and precedents. The WIPO Database on Biodiversity-related Access and Benefit-sharing

Agreements is currently online at:

<<http://www.wipo.int/tk/en/databases/contracts/index.html>>.

- b) Intellectual Property Guidelines for Access to Genetic Resources and Equitable Sharing of the Benefits arising from their Utilization. The guidelines provide practical information for providers and recipients of GRs and relevant policy and legal information. They illustrate the practical issues that providers and recipients are likely to face when negotiating an agreement, contract or license, and thereby enhance the information available to stakeholders assessing their intellectual property options when considering access and benefit-sharing. The guidelines are available online at: <http://www.wipo.int/export/sites/www/tk/en/resources/pdf/redrafted_guidelines.pdf>.