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联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Alimentación y la Agricultura | منظمة الأغذية والزراعة للأمم المتحدة

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 14 of the Provisional Agenda

Seventeenth Regular Session

Rome, 18–22 February 2019

SUBMISSIONS BY INTERNATIONAL INSTRUMENTS AND ORGANIZATIONS

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I. INTRODUCTION

1. The Commission, at its Sixteenth 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. The Commission operates under a Multi-Year Programme of Work or MYPOW, a planning tool to schedule and review its work, with a rolling horizon of five Commission sessions (i.e. ten years). The MYPOW was adopted by the Commission in 2007 and last revised in 2017. In the context of its MYPOW, the Commission has welcomed the proposal to reduce routine reporting, in favour of focused consultations of international instruments and organizations on prioritized themes of the session.

3. On 31 August 2018, FAO invited through Circulate State Letter C/CBD-725-ORG-9 relevant international instruments and organizations to provide focused information on their policies, programmes and activities relevant to the Commission's Seventeenth Regular Session by completing a questionnaire. This document compiles the twelve submissions received by the Secretariat, for information of the Commission. The submissions, as presented in this document, follow the format of a questionnaire circulated by the Secretariat to international instruments and organizations.

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

[1] CGRFA-16/17/Report Rev.1, paragraph 92.
[2] CGRFA-17/19/14/Inf.2
[3] CGRFA-17/19/14/Inf.3
[4] CGRFA-17/19/14/Inf.4
[5] CGRFA-17/19/14/Inf.5

II. SUBMISSIONS BY INTERNATIONAL INSTRUMENTS AND ORGANIZATIONS

A. The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)

Geographical coverage of the instrument/organization

Arab Region, comprised of 22 countries members of The League of Arab States

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

ACSAD is playing a major role in conservation of animal genetic resources in the Arab Countries either through In situ propagation method in 22 research stations distributed in the Arab region for improvement and management of animal genetic resources, and also by using Ex situ techniques for conservation of animal genetic resources. ACSAD has been implementing training courses and capacity building programmes in conservation of genetic resources for professionals and technicians in the ministries of agriculture in the Arab countries. ACSAD has published Atlas of 278 local livestock breeds, including 50 of sheep, 66 of goats, 32 of camels, 41 of cattle, 36 of horses and donkeys, 3 of buffalo, and 50 of rabbits and chickens. Currently, ACSAD is cooperating with the Arab Counties to develop a regional Animal Genetic Resources Database. 12000 straws of improved Awassi sheep and Shami goats breeds are produced and deposited every year to be distributed among the interested Arab countries.

Aquatic genetic resources

Forest genetic resources

Plant genetic resources

ACSAD has been taken actions toward the conservation of GRFA in the Arab region such as collecting and evaluating of 3000 accessions from durum wheat, breed wheat, and barley; establishment of plant genetic resources in Syria for 469 drought tolerant fruit trees species including, olive, almonds, pistachio, figs and grapes; establishment a central Herbarium for rangeland genetic resources contain more than 1000 plant species collected from the Arab Countries; recently, ACSAD initiated a specific project for propagation of genetic resources of endangered medical, range, aromatic plant species. ACSAD has produced 25 varieties of durum wheat, bread wheat and barley which are distributed and cultivated in the Arab region. Collecting and promoting conservation of landraces including, 36 of wheat, 11 of Vetch, 45 of Sorghum from different eco-region in Syria. ACSAD introduced 25 varieties and lines of high productive drought tolerant millet. In situ conservation and propagation of rangeland native plant species though establishment of plant genetic resources conservation and propagation fields in Syria is adopted by ACSAD.

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Invertebrates (including insects, spiders, worms)

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:
Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

  ACSAD Program of Biodiversity Conservation aims to document the biodiversity in the Arab region by inventorying, collecting and documenting the plant genetic resources, establishing databases, and producing atlases of native plants. ACSAD is working with the Arab group responsible of following up the International Environmental Conventions, including CBD and Cartagena Protocol for Biosafety to coordinate Arab efforts of biodiversity conservation. To develop the productive performance of local animal breeds in the Arab region, ACSAD established two programmes i.e. Small ruminant care and genetic improvement, and development and application of artificial insemination and embryo transfer techniques. ACSAD experts will attend the COP-14 of CBD to be held in Sharm El Sheikh, Egypt, from 17 to 29 November 2018. Distribution of rangelands native plant seeds, durum wheat, breed wheat, barley varieties, cutting and seedling of local drought tolerant fruit trees species such as olive, almonds, pistachio, figs and grapes in the different Arab countries. Rehabilitation of degraded rangelands using native plant species and water harvesting techniques.

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

  ACSAD has produced several atlases including, Atlas of Rangelands Plants in the Arab region, Atlas of Syrian Badia Plants, Atlas of Medicinal and Aromatic Plants in the Arab region, Atlas of Atlas of local livestock breeds in the Arab region.

- Use of "digital sequence information[6]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

  Molecular characterization and documentation of genetic resources of wild plants, crop varieties, and date palm strains in the Arab region.
  Establishment of laboratories for biotechnology, agricultural microbiology, crop diseases and plant tissue culture to enable researchers to propagate and conserve endangered, wild and cultivated plant species.

- Review of work on GRFA and nutrition

[6] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

Plant genetic resources

- Review of status and trends of seed policies

B. Center for Agriculture and Bioscience International (CABI)

Geographical coverage of the instrument/organization

Global: owned by 49 countries in Africa, Asia, Australasia, Europe, South America and North America see: https://www.cabi.org/membership/member-countries/

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

None

Aquatic genetic resources

None

Forest genetic resources

None

Plant genetic resources

Working collections of invasive weeds for biological control programmes

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Living collection of fungi (28000 strains) and bacteria (2000 strains) from 142 countries including the UK National Collection of Fungus Cultures. The collection represents organisms of beneficial importance to GRFA as well as pathogens. Over 6000 species of fungi are represented with organisms from soil and plant microbiome https://www.cabi.org/services/microbial-services/culture-collection-microorganism-supply/ Examples of organisms available for supply: •Filamentous fungi and yeasts. •Plant pathogenic bacteria. •Biocontrol agents belonging to these groups. •Production strains for enzymes, metabolites, active biomolecules and novel products. •Authenticated reference, type and test strains for businesses and research establishments. •ISO846, BS2011 Part II j and Mil Std 810G test strains from the European, the UK and US testing standards and other test and challenge strains. CABI is also working actively on the management of pathogens that cause diseases in crops, and the use of pathogens as biological control agents for insect pests – both as biopesticides and as components of Integrated Pest Management and Integrated Crop Protection systems.

Invertebrates (including insects, spiders, worms)

CABI rears and supplies the North American weevil *Stenopelmus rufinasus* as a natural enemy of *Azolla* sp. The weevil has been used to control the weed very successfully in the UK and South Africa, where after extensive host range testing, it was released as a biocontrol agent. Recipients include water managers at English Nature, British Waterways and the Environment agency; we can also supply individuals from the public if required. (see www.azollacontrol.com) Working collections of arthropods for use in biological control research and development. CABI is actively working on arthropods as potential classical biological control agents of crop pests and weeds in diverse parts of the world.

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

None

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

CABI's invasive species programme impacts here https://www.cabi.org/projects/controlling-invasive-species/

Regulating and supporting ecosystem services

A number of CABI projects impact on ecosystem services for example Restoring grasslands of the Qinghai-Tibet Plateau https://www.cabi.org/projects/project/66013; Woody weeds in East Africa https://www.cabi.org/projects/project/44690;

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

1. CABI continues to preserve bacteria and fungi in its living collections as reference strains to underpin diagnostics, plant disease research and for microbial interventions to reduce crop and commodity losses and to improve production. The CABI Plantwise project continues to train plant doctor, rum plant clinics and support farmers to grow more and lose less (https://www.plantwise.org/).
2. CABI is co-leading a UK plant Microbiome Initiative see below; https://www.cabi.org/news-and-media/2017/cabi-and-rothamsted-research-launch-uk-plant-microbiome-initiative/ and the reference Matthew Ryan & Tim Mauchline (2018) Introducing the UK Plant Microbiome Initiative. Microbiologist Vol 19 No 3: ISSN 1479-2699| September 2018 pp54-55.
   The phytobiome approach supports key priority research areas such as evaluation of the role of microbial interactions in plant health and activities/resources to underpin science. It also supports key sustainable development goals (SDGs): 2 (Zero Hunger), 12 (Responsible Consumption and Production) and 15 (Life on Land). The impacts of research based on the plant microbiome will have implications for plant health globally, improved food security and invasive species management. The International Phytobiome Alliance (an industry–academic collaborative) has gained support from Monsanto, Bayer and other key donors in the field. This is supported by the Phytobiomes Roadmap which offers a detailed vision and action plan for agriculture. In Europe, the UK Plant Microbiome Initiative, initiated by Rothamsted and CABI and with support from industry and academia is also forming a broad Agritech stakeholder base and is taking an open innovation approach, with a view to establishing a secretariat to deliver its objectives both nationally and globally. The initiative seeks to:
   - Establish a multidisciplinary 'one stop' shop for Agritech users.
   - Provide access to expertise and resources.
   - Bring together interested parties (donors, industry, scientific societies, academia, research institutes, non-profit organizations etc.).
   - Promote open innovation.
   - Coordinate and prioritize research in association with donors and industry stakeholders.
   - Provide a rapid response to national and global threats to food security through coordinated action.

The most recent meeting was held at the Rothamsted Open Innovation Forum where stakeholders from across the UK met to map out ways of improving engagement between researchers, industry and donors.

3. CABI has been working in invasive species for a hundred years and has recently launched an invasive species programme see https://www.cabi.org/projects/controlling-invasive-species/ and https://www.invasive-species.org/. Invasive species, such as weeds, animals and microorganisms are a major issue – threatening ecosystems, habitats and other species when they become established and spread. Many of the species that cause problems are non-native, so we focus on helping to manage these.

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

CABI has continued to work with provider countries to ensure compliance with ABS requirements whilst facilitating organism and information exchange to enable its research and support for agriculture. Countries despite becoming party to the Nagoya protocol are still resolving how the approach access and benefit sharing. Over 50 countries have law and others party to the Nagoya protocol are designing theirs. It is a particular difficult time for negotiation of access and reaching mutually agreed terms on use and benefit sharing. CABI has published its ABS policy on line https://www.cabi.org/about-cabi/business-policies/ under Environmental Policy and has drafted ABS best practice which it is seeking country endorsement for. The UK National Focal Point (Defra) and the UK Regulator (BEIS) confirmed that the process set out (in the CABI best practice) would, if followed in full, be sufficient to demonstrate due diligence and compliance with the EU Regulation – though it is not in their capacity to currently recognise as Best Practice unilaterally. The best practice has been sent to National Authorities in 15 countries to seek endorsement.

See CABI publications on the topic:

- **David Smith**, Manuela da Silva, Julien Jackson and Christopher Lyal (2017) Explanation of the Nagoya Protocol on Access and Benefit Sharing and its implication for microbiology. Microbiology 163: 289-296. doi: 10.1099/mic.0.000425. http://mic.microbiologyresearch.org/content/journal/micro/10.1099/mic.0.000425
- McCluskey K, Barker KB, Barton HA, Boundy-Mills K, Brown DR, Coddington JA, Cook K, Desmeth P, Geiser D, Glaeser JA, Greene S, Kang S, Lomas MW, Melcher U, Miller SE, Nobles DR, Jr., Owens KJ, Reichman JH, da Silva M, Wertz J, Whitworth C, **Smith D.** 2017. The U.S. Culture Collection Network responding to the requirements of the Nagoya Protocol on Access and Benefit Sharing. mBio 8:e00982-17. https://doi.org/10.1128/mBio.00982-17. . http://mbio.asm.org/content/8/4/e00982-17.full
- Boundy-Mills, K., **Smith, D.**, McCluskey, K., Greene, S., Duke, C. 2017. International Treaty Affects Microbiology Research. Microcosm, 1(Fall 2017), 82-85.
- **David Smith** (2017) 4.2 Practical and Implementable Mechanisms for Compliance with the Nagoya Protocol: Access and Benefit Sharing. In: Proc. 5th International Symposium on Biological Control of Arthropods (eds P.G. Mason, D.R. Gillespie and C. Vincent) . Wallinford, UK: CAB International. ISBN: 978 1 78639 411 8; Date of Publication: 08/09/2017; Only available as an Open Access eBook http://www.cabi.org/cabebooks/ebook/20173267430
- **David Smith**, **Hariet Hinz**, **Joseph Mulema**, **Philip Weyl** & **Matthew J. Ryan** (2018) Biological control and the Nagoya Protocol on access and benefit sharing – a case of effective due diligence, Biocontrol Science and Technology, DOI: 10.1080/09583157.2018.1460317 https://doi.org/10.1080/09583157.2018.1460317 https://www.tandfonline.com/eprint/4cN3Pw8Q9xtqVvd3bSe3/full

- Use of "digital sequence information[7]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

CABI uses DSI which it generates to support the diagnosis of crop pests and beneficial organisms for many of its partner developing countries. In practice, this support can only be provided to those countries which facilitate the export of such biological material (containing genetic resources) for identification and do not restrict the acquisition and publication of DSI thereby generated.
The UK National Focal Point invited stakeholders to comment further on the use of digital sequence information. CABI submitted the following: Current position and concerns regarding DSI:
CABI continues to believe that amendments to the Nagoya Protocol are not necessary in respect to Digital Sequence Information (DSI) and are happy to see it treated at a Country level. However, this would mean that countries will take their own position on this potentially making international collaboration and usage potentially difficult. To avoid this, it would be helpful to have a common agreement on the generation of DSI and how it can be used in order not to impede innovation in the life sciences.
CABI position
- Generating and publishing sequence data is considered by CABI as the production of descriptive information on the organism and therefore not utilisation. As such, it is out of Nagoya Protocol regulatory scope.
- Publishing the sequence as electronic data is an act of sharing such descriptive information and thus meets any benefit-sharing commitment required from access to sequence the organism.
- DSI can be used at many non-exploitative levels: for example, it is used to confirm identification and in the CABI understanding this is an observation; in most cases the sequence is published.
- if DSO is used for financial benefit then this could be considered utilisation and the full benefit sharing aspect would be negotiated with the provider country as would be done for access to the organism
- The generation and use of DSI must be considered at the point of access and be expressed in the Mutually Agreed Terms (MAT) and presented in any Material Transfer Agreement (MTA) for clarification on what can and cannot be done regarding DSI.

Generation and use of DSI should be considered when accessing the genetic resource to the extent that benefit-sharing is required under the CBD. However, the generation and publishing of such data is not "utilisation" and should not trigger the Nagoya Protocol. Further, we suggest that such generation and publishing of DSI should be considered as part of a country's responsibilities under Article 7 (Identification and Monitoring) and 17 (Exchange of Information) of the CBD. Requirements will vary from country to country but should include placing the DSI in the public domain and its subsequent use can be defined in standard Material Transfer Agreements. Likely benefits could include sharing the developed tool or enabling access to the generated product but in most cases the benefit is likely to be facilitating access to the published data and no more. It would be preferred that a single common global understanding was reached to ensure full compliance and thereby reduce confusion.
In Europe there is an additional problem because the EU in their guidance documents are using the Frascati definition of research and development http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en to help define "utilisation" and this includes the generation of knowledge. In this case generating

[7] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

DSI would consequently be “utilisation” and trigger benefit-sharing. However, the guidance documents go on to describe sequencing as a descriptive step or confirming identity which is NOT utilisation – there is still work needed to clarify.

Annexe: DSI position submitted August 2017 (as outlined above)

CABI response on potential implications of the use of digital sequence information (DSI) from genetic resources for the three objectives of the Convention, and for the objective of the Nagoya Protocol.

At its thirteenth meeting, the Conference of the Parties to the Convention on Biological Diversity (CBD) considered the issue of digital sequence information on genetic resources and adopted decision XIII/16, in which it decided to consider, at its fourteenth meeting, any potential implications of the use of digital sequence information (DSI) on genetic resources for the objectives of the Convention on Biological Diversity.

Summary statement

CABI considers that amendments to the Nagoya Protocol are not necessary in respect to Digital Sequence Information (DSI) as it is already captured in the definition of the genetic resources and genetic material covered by the Convention on Biological Diversity (CBD). “Genetic resources‟ means genetic material of actual or potential value. “Genetic material‟ means any material of plant, animal, microbial or other origin containing functional units of heredity. CBD 19 Mar 2010; https://www.cbd.int/doc/meetings/abs/abswg-09/information/abswg-09-inf-01-en.pdf. DSI describes the resource or material and in a functional form would be a “derivative” and its use and benefits can be treated at a country level at the point of access to genetic material. However, it would be helpful to have a common agreement on the generation of DSI and how it can be used in order not to impede innovation in the life sciences.

CABI position

- Generating and publishing sequence data is considered by CABI as the production of descriptive information on the organism and therefore not utilisation. As such, it is out of Nagoya Protocol regulatory scope.
- Publishing the sequence as electronic data is an act of sharing such descriptive information and thus meets any benefit-sharing commitment required from access to sequence the organism.
- DSI can be used at many non-exploitative levels: for example, it is used to confirm identification and in the CABI understanding this is an observation; in most cases the sequence is published.
- if DSO is used for financial benefit then this could be considered utilisation and the full benefit sharing aspect would be negotiated with the provider country as would be done for access to the organism
- The generation and use of DSI must be considered at the point of access and be expressed in the Mutually Agreed Terms (MAT) and presented in any Material Transfer Agreement (MTA) for clarification on what can and cannot be done regarding DSI.

CABI reasoning

The debate continues within the regulator and stakeholder communities, on whether access to Digital Sequence Information (DSI) should be treated in the same way as would accessing the genetic resource or material (organism) itself. It is obvious they are not the same thing as currently more can be done with the organism than with a partial sequence or even an entire genome. In essence, generation of a sequence requires the genetic resource, itself, to be accessed; the DSI is a product of that access, a “derivative”. However, generating and publishing sequence data is considered by CABI as descriptive information and therefore not utilisation and, as such, it is out of regulatory scope. Publishing the sequence as electronic data is an act of sharing such descriptive information with the wider community – including the provider country. DSI can be used at many non-exploitative levels; for example, it is used to confirm identification and in the CABI understanding this is an observation; in most cases the sequence is published. European draft guidance indicates that taking the sequence information and using it to develop a product or tool is out of scope but we are aware that other countries are not of that opinion

(this is still in debate at COP). However this does not negate the need for benefit sharing and in this case it is the actual publication of the DSI that shares the benefits of access to the genetic resources from which it was generated.
Selected DSI are becoming standard tools for identification and phylogenetic characterisation of species and populations: mitochondrial CO1 'barcodes' for animals; plastid matK and rbcL barcodes for plants;16S ribosomal DNA for bacteria, and ITS for many eukaryotes (including Fungi), have become standard tools in modern taxonomy and identification, although the real power of this approach becomes most obvious when sequences from multiple individuals and sources (countries) is freely shared and duly acknowledged. In the future, whole genome sequencing will, without any doubt, have a similar impact on taxonomy. We argue strongly that DSI generated for taxonomic or descriptive purposes needs to be freely shared in the public domain to help address the taxonomic impediment that the CBD recognises, as well as to meet the needs of agriculture and other sciences.
Conclusion
Generation and use of DSI should be considered when accessing the genetic resource to the extent that benefit-sharing is required under the CBD. However, the generation and publishing of such data is not "utilisation" and should not trigger the Nagoya Protocol. Further, we suggest that such generation and publishing of DSI should be considered as part of a country's responsibilities under Article 7 (Identification and Monitoring) and 17 (Exchange of Information) of the CBD. As new technologies develop, DSI may have additional uses that could trigger benefit-sharing and this should be subject to equitable sharing of benefits. Requirements will vary from country to country but should include placing the DSI in the public domain and its subsequent use can be defined in standard Material Transfer Agreements. Likely benefits could include sharing the developed tool or enabling access to the generated product but in most cases the benefit is likely to be facilitating access to the published data and no more. It would be preferred that a single common global understanding was reached to ensure full compliance and thereby reduce confusion.
NOTE FOR SUBMISSION IN UK and to EC: In Europe there is an additional problem because the EU in their guidance documents is using the Frascati definition of research and development http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en to help define "utilisation" and this includes the generation of knowledge. In this case generating DSI would consequently be "utilisation" and trigger benefit-sharing. However, the guidance documents go on to describe sequencing as a descriptive step or confirming identity which is NOT utilisation – there is still work needed to clarify.

- Review of work on GRFA and nutrition

CABI's 'Nutrition and Food Sciences' is a specialist internet resource covering human nutrition, food science and food technology. No other resource can provide such a comprehensive view of the food chain or of the interactions between diet and health. Compiled by specialists, the resource contains more than 1.5 million records dating back to 1973, with over 80,000 added annually. There are now more than 75,000 records with full text hosted by CABI. https://www.cabi.org/publishing-products/online-information-resources/nutrition-and-food-sciences-database/

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

CABI currently is a partner in the EMBRIC - European Marine Biological Research Infrastructure Cluster project www.embric.eu/. EMBRIC) is designed to accelerate the pace of scientific discovery and innovation from marine Bio-Resources. EMBRIC aims to

promote new applications derived from marine organisms in fields such as drug discovery, novel foods and food ingredients, aquaculture selective breeding, bioremediation, cosmetics and bioenergy.
•By conducting a comprehensive survey of available resources and techniques, EMBRIC will develop new pipelines and new industry standards.
•By interconnecting science, industry and policy, EMBRIC will defragment regional research, development and innovation policies.
•By implementing joint academia-industry development activities, EMBRIC will allow industry to directly integrate results and protocols in commercial processes.
•By developing best practices and integrated training programs, EMBRIC will accelerate the pace of scientific discovery and innovation.
•By connecting 6 existing European Research Infrastructures and 29 partners from Academia, Research institutes, non-for-profit organizations and industry, EMBRIC will facilitate technology transfer, knowledge transfer and transnational access.
In general, EMBRIC will provide a long-term integrated cluster approach to promote the Blue Bio-Economy.

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

N/A

Plant genetic resources

- Review of status and trends of seed policies

CABI's Seed Abstracts "Seed Abstracts is an online resource of relevance brings you the latest information on seed science, covering all aspects of research on both wild and cultivated plants." https://www.cabi.org/publishing-products/online-information-resources/seed-abstracts/;
Specific CABI projects of relevance are: Promoting good seed in East Africa https://www.cabi.org/projects/project/32994; Seed systems https://www.cabi.org/projects/food-security/seed-systems/;

C. Council of Europe, Bern Convention on the Conservation of European Wildlife and Natural Habitats

Geographical coverage of the instrument/organization

The Council of Europe has 47 member states. The Bern Convention has 51 Contracting Parties, including 4 African states and the European Union.

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

The Bern Convention puts in place a Network of Areas of Special Conservation Interest – the Emerald Network. Each of the Convention's Contracting Parties identifies, designates and manages Emerald Network areas on its territories and thus contributes to the long-term survival (favourable conservation status) of a list of species (animals and plans) and habitats of European importance.

On the (4) criteria for the evaluation of the representativity of the Emerald Network sites of each country for the list of species and habitats is linked to animal genetic diversity:
- The Emerald Network sites within a country and biogeographic region should reflect the ecological variation of the habitat and of the species (genetic) within the biogeographical region. In case of species, site proposals must include the whole range of habitats that are needed for the different stages of its life-cycle such as reproduction, migrations, foraging (etc.)

Aquatic genetic resources

Forest genetic resources

Plant genetic resources

In addition to the Emerald network of Areas of Special Conservation Interest (see above) which is also implemented for the benefit of plants, the Bern Convention on the Conservation of European Wildlife and Natural Habitats has adopted the European Plant Conservation Strategy, the only existing regional tool for the implementation of the Global Plant Conservation Strategy. The issue of the endurance of plant genetic diversity and the long term survival of plant species and communities and their habitats is dealt with in the European Strategy. The assessment of the European Strategy, including a revision for the post-2020 period is foreseen for 209-2020.

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Invertebrates (including insects, spiders, worms)

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

The Emerald network of Areas of Special Conservation Interest also helps maintain ecosystem structures, through habitats conservation measures and ultimately, ecosystems functioning.

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

- Use of "digital sequence information[8]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

- Review of work on GRFA and nutrition

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

Plant genetic resources

- Review of status and trends of seed policies

[8] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

D. International Fund for Agricultural Development (IFAD)

Geographical coverage of the instrument/organization

Global

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

IFAD through its investment projects and grants (i) support the development of sustainable livestock production systems with smallholder producers and pastoralists; (ii) do not promote industrialized livestock production systems, and (iii) support livestock production systems which build on local knowledge of producers, the utilization of local breeds and maintain biodiversity.

Aquatic genetic resources

Several species of **Finfish** (Freshwater and Marine species e.g. tilapia, carp fish, cat fish, pangus, sardines, groupers, snappers, tuna etc.), **Molluscs** (e.g. Oysters), **Crustaceans** (e.g. crabs, shrimps, lobsters etc.), **Aquatic plants** (sea weeds etc.); **Aquatic algae** (e.g. *Spirulina* , *Nannochloropsis etc.)*, **other aquatic organisms** e.g. Sea cucumbers

Forest genetic resources

N/A

Plant genetic resources

Support for community seed banks and local seed exchange systems for varieties selected by the communities for their different stress tolerance, cooking, taste, nutrition and other characteristics (grant and loan supported activity). Participatory variety selection and promotion of the use and marketing of neglected and underutilized crops with high nutrition and stress resilience potentials in collaboration with Bioversity (grant supported activity with some uptake in the loan portfolio). Deployment of genetic resources and mixtures of varieties from international, national and community genebanks directly by farmers in the field to increase resilience under low input conditions: crops presently used are beans, barley, wheat, rice (grant supported innovation and piloting activity with future potentials for uptake in the loan portfolio).

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

N/A

Invertebrates (including insects, spiders, worms)

N/A

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

N/A

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

N/A

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

N/A

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

N/A

- Use of "digital sequence information[9]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

N/A

- Review of work on GRFA and nutrition

N/A

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

N/A

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

N/A

Plant genetic resources

- Review of status and trends of seed policies

Assess and identify policy options for the promotion, access and benefit sharing of evolutionary breeding populations and the use of plant genetic resources for food and agriculture (PGRFA). This include to review seed policies and regulations. The assessments are done and made available to local and national decision makers in Nepal, Bhutan, Ethiopia, Jordan and Iran where a pilot project is working.

[9] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

E. IFOAM – Organics International

Geographical coverage of the instrument/organization

Global

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

Organic animal management uses breeds that reproduce successfully under natural conditions and without routine human involvement (IFOAM Norms). Breeds are adapted to local conditions (IFOAM Norms). Ancient breeds are often a good solution in organic husbandry.

Aquatic genetic resources

Organic aquaculture management maintains the biodiversity of natural aquatic ecosystems, the health of the aquatic environment, and the quality of surrounding aquatic and terrestrial ecosystem. Aquatic animal production systems shall use breeds and breeding techniques suited to the region and the production method (IFOAM Norms).

Forest genetic resources

Plant genetic resources

Species and varieties cultivated in organic agriculture systems are selected for adaptability to the local soil and climatic conditions and tolerance to pests and diseases (IFOAM Norms). Organic plant breeding and variety development is sustainable, enhances genetic diversity and relies on natural reproductive ability. It aims for new varieties particularly suited for organic production systems. Organic breeding is always creative, cooperative and open for science, intuition, and new findings. Organic plant breeding is a holistic approach that respects natural crossing barriers. Organic plant breeding is based on fertile plants that can establish a viable relationship with the living soil (IFOAM Norms). The genome is respected as an impartible entity. Technical interventions into the genome of plants are not allowed (e.g. ionizing radiation; transfer of isolated DNA, RNA, or proteins) (IFOAM Norms). The cell is respected as an impartible entity. Technical interventions into an isolated cell on an artificial medium are not allowed (e.g. genetic engineering techniques; destruction of cell walls and disintegration of cell nuclei through cytoplast fusion) (IFOAM Norms). The natural reproductive ability of a plant variety is respected and maintained. This excludes techniques that reduce or inhibit the germination capacities (e.g. terminator technologies) (IFOAM Norms).

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Organic farming returns microbial, plant or animal material to the soil to increase or at least maintain its fertility and biological activity (IFOAM Norms).

Invertebrates (including insects, spiders, worms)

Organic farming includes the protection of natural enemies of pests through provision of favorable habitat, such as hedges, nesting sites and ecological buffer zones that maintain the original vegetation to house pest predators (IFOAM Norms).

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Organic farming includes the protection of natural enemies of pests through provision of favorable habitat, such as hedges, nesting sites and ecological buffer zones that maintain the original vegetation to house pest predators (IFOAM Norms).

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

Organic operators shall design and implement measures to maintain and improve landscape and enhance biodiversity quality, by maintaining on-farm wildlife refuge habitats or establishing them where none exist. Such habitats may include, but are not limited to: a. extensive grassland such as moorlands, reed land or dry land; b. in general all areas which are not under rotation and are not heavily manured: extensive pastures, meadows, extensive grassland, extensive orchards, hedges, hedgerows, edges between agriculture and forest land, groups of trees and/or bushes, and forest and woodland; c. ecologically rich fallow land or arable land; d. ecologically diversified (extensive) field margins; e. waterways, pools, springs, ditches, floodplains, wetlands, swamps and other water-rich areas which are not used for intensive agriculture or aquaculture production; f. areas with ruderal flora; g. wildlife corridors that provide linkages and connectivity to native habitat. (IFOAM Norms).

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

Last November, during the UN-led Convention of Biological Diversity a new report was released of 338 community-based solutions to help farmers and other agricultural practitioners adopt ecologically-friendly practices that protect biodiversity. The report catalogs solutions unearthed by Solution Search: Farming for Biodiversity, a global completion held in 2017 and run in joint partnership by Rare and IFOAM-Organics International, to identify, spotlight and reward promising solutions for sustainable small-scale farming. Download the full report at http://bit.ly/FarmingForBiodiversity

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

- Use of "digital sequence information[10]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

- Review of work on GRFA and nutrition

[10] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

Plant genetic resources

- Review of status and trends of seed policies

IFOAM Organics International at its General Assembly in New Delhi (India), on November 2017 adopted a global position that reaffirms that GMOs created through **new genetic engineering technique**s have no place in organic food and farming systems. Download the full report at https://www.ifoam.bio/sites/default/files/position_paper_v01_print_ca_0.pdf

F. Intergovernmental Authority on Development (IGAD)

Geographical coverage of the instrument/organization

8 countries in the Greater Horn of Africa, namely, Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda.

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

Support to national animal genetic banks (Ethiopia)

Aquatic genetic resources

Studies of conservation of coastal and marine ecosystems undertaken (Local Marine Conservation Areas identified for Djibouti

Forest genetic resources

Forest genetic / plant genetic databases strengthen in the member states. Soft- and hardware provided to member states. BRHAMS software with license provided to BD Herbariums in the member states

Plant genetic resources

Forest genetic / plant genetic databases strengthen in the member states. Soft- and hardware provided to member states. BRHAMS software with license provided to BD Herbariums in the member states

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Invertebrates (including insects, spiders, worms)

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

- ***developed a regional BD Policy, a regional BD Protoco, a regional Wildlife Management Strategy, a regional Invasive Species Control and Management Strategy and a regional Biodiversity Benefit Sharing Strategy)***
- ***Developed a Regional Fisheries Management Strategy***
- ***Initiated national and Regional BD Databases and Information Systems***

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

- Use of "digital sequence information[11]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

- Review of work on GRFA and nutrition

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

A Regional Forest Policy and Strategy under development with the support of FAO.

Plant genetic resources

- Review of status and trends of seed policies

[11] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

G. International Institute for Environment and Development (IIED)

Geographical coverage of the instrument/organization

Asia, Africa, Latin America

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

To some extent through the Drylands Programme - though the work focuses mainly on pastoralist systems, their contribution to the economy and climate adaptation, and establishing mechanisms to channel climate finance to local level, rather than on genetic diversity per se. SIFOR Kenya included a focus on livestock diversity in Mijikenda communities in Kenya – see below.

Aquatic genetic resources

Forest genetic resources

Plant genetic resources

Yes – the SIFOR project "Smallholder Innovation for Resilience" (2012-2017) and previous IIED research with partners looked at trends in crop diversity in Southwest China, Peruvian Andes, coastal Kenya, and Eastern Himalayas, India. SIFOR looked at the status and trends in staple food crop diversity in 64 indigenous communities. It found a rapid decline in some cases (eg. China and Kenya). The findings are documented in the following reports and briefing papers:
http://pubs.iied.org/pdfs/G03146.pdf - SW China report 2011
http://pubs.iied.org/pdfs/17111IIED.pdf - IIED briefing 2011
http://pubs.iied.org/pdfs/17410IIED.pdf - SIFOR briefing paper 2016
http://pubs.iied.org/17465IIED/ - SIFOR briefing paper 2017
http://pubs.iied.org/14663IIED/ - SIFOR country report Peru 2016
http://pubs.iied.org/pdfs/14664IIED.pdf - SIFOR Country report China 2016
http://pubs.iied.org/17611IIED/ - SIFOR Kenya report 2017
http://pubs.iied.org/17618IIED/- SIFOR India report

IIED is also working with partners in China, Peru, Kenya and India to support the establishment of biocultural heritage territories for on farm and in situ conservation in centres of crop domestication and/or diversity, based on Peru's successful Potato Park model. These biocultural territories or landscapes support gene flows between wild and domesticated populations (ie. on farm-ex situ linkages) to enable continued domestication and co-evolution processes by indigenous communities for local and global food security in the face of climate change – ie. to sustain evolving gene banks for adaptation. See: http://pubs.iied.org/G03843/

IIED is also working with ANDES (Peru) and the International Network of Mountain Indigenous Peoples to establish a global network of biocultural territories in centres of crop domestication and/or diversity through horizontal exchanges and capacity building, see: http://pubs.iied.org/14670IIED/

The Sustainable Diets for All programme with its partners in Uganda have engaged in campaigns to promote seed diversity and farmers' rights for unrestricted access to indigenous plant and seed varieties. Recently the programme organised a National Seed Dialogue together with the Food Rights Alliance, SEATINI and Oxfam. Whilst farmers and farming communities in Uganda continue to maintain indigenous seed and plant varieties, technology advancement threaten their sustained existence and biodiversity. The dialogue sought to examine the current status of indigenous seed and

plant varieties, their significance for the food system and populations in Uganda and elaborate concrete actions that need to be taken to protect indigenous seeds and plants.

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

IIED and partner research on trade-offs between food security and biodiversity conservation in Sub-Saharan Africa (www.sentinel-gcrf.org) analyses the links between agricultural expansion into natural habitats and the effect of this land use change on various biodiversity services of relevance to food and agriculture, including soil biological properties.

Invertebrates (including insects, spiders, worms)

As above - effect of this land use change on pollinators.

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

  See above mentioned SIFOR reports and briefing papers

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

- Use of "digital sequence information[12]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

- Review of work on GRFA and nutrition

  IIED's project on 'Sustainable Diets for All', see:

  http://pubs.iied.org/pdfs/G04305.pdf - Discussion Paper

  http://pubs.iied.org/G04255/ - Briefing

  For more information and publications see: https://www.iied.org/sustainable-diets-for-all

Sectorial matters

Aquatic genetic resources

[12] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

Plant genetic resources

- Review of status and trends of seed policies

We have done some work on seed policies in China, Peru, India, Kenya – see above SIFOR reports and briefings, including http://pubs.iied.org/pdfs/14664IIED.pdf - SIFOR China report. See also SIFOR workshop reports:
http://pubs.iied.org/pdfs/G04288.pdf - SIFOR India Himalayas workshop, 2017
http://pubs.iied.org/14665IIED/ - SIFOR Kenya workshop, 2015
IIED works with the Centres for Chinese Agricultural Policy and the National Farmer Seed Network in China which actively engage in seed policy debates in China. For details on the revision of China's seed law see:
https://biocultural.iied.org/twn-info-some-important-provisions-china%E2%80%99s-revised-seed-law

H. Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, International Atomic Energy Agency

Geographical coverage of the instrument/organization

Global

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture (AGE) 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 Animal Production and Health Section (APHS) is "Innovative nuclear based approaches to maintain biodiversity and enhance livestock productivity". The programs and activities of AGE that focussed on the implementation of GPA-AnGR under each of the strategic priority areas of GPA are given below.

Strategic Priority Area 1: Characterization, inventory and monitoring of trends and risks

The Joint Division provided technical support to 29 FAO/IAEA Member States (Argentina, Bangladesh, Bolivia, Brazil, Bulgaria, Burkina Faso, Cambodia, Costa Rica, Cuba, Dominican Republic, El Salvador, India, Iraq, Kenya, Malaysia, Mali, Mexico, Niger, Nigeria, Paraguay, Peru, Serbia, South Africa, Sri Lanka, Sudan, Tunisia, Uruguay, Venezuela and Zambia) on phenotypic and molecular characterization of indigenous livestock breeds. Since the Commission's sixteenth regular session, the Joint Division successfully implemented six IAEA National Technical Cooperation Projects (Papua New Guinea (PAP5002); Peru (PER5032; Sudan (SUD5036); Burkina Faso (BKF5017); Cambodia (KAM5003) and Bangladesh (BGD5030)) and one Regional technical cooperation project in Latin America (ARCAL; RLA5071) with an active component on animal genetic resource characterization.

The Joint Division supported genetic characterization of 44 breeds/populations of cattle, sheep, goat and guinea fowl across six countries (Bangladesh, Bulgaria, Burkina Faso, India, Niger, Sudan) through various national and regional technical cooperation projects. Further, to address the issue of lack of availability of genomic tools and resources for certain livestock species, The Animal Production and Health Laboratory of the Joint Division initiated the development of genome mapping resources like radiation hybrid (RH) panels for camel. The Joint Division transferred the camel RH panels to members of International Camel Genome Consortium in 2018 and is expected to stimulate development of DNA based tools for genetic evaluation and breeding of this important species. The Joint Division also developed a cost-effective genotyping tool to support marker assisted breeding programs for the improvement of prolificacy in small holder sheep flocks.

The Joint Division trained 17 fellows in DNA marker based genetic characterization of domestic animal breeds at its Animal Production and Health Laboratory in Seibersdorf, Austria. The trainees came from 11 countries (Austria, Argentina, Bulgaria, Burkina Faso, India, Iraq, Malaysia, Nigeria, Papua New Guinea, Sri Lanka, Sudan) and the fellowships ranged from 1 to 3 months. The Joint Division also implemented three regional training courses: (i) Regional training course on "Genetics of Parasite Resistance in Sheep: Sampling, Data Collection, Management and Analyses" at Montevideo, Uruguay with 29 participants from 11 countries (Argentina, Bolivia, Brazil, Costa Rica, Cuba, Dominican Republic, Mexico, Paraguay, Peru, Uruguay and Venezuela) (ii) Regional training

course on "Genetics of Parasite Resistance in Sheep: Animal Breeding and Selection Practices" at Rio Negro, Argentina with 22 participants from 11 countries and (iii) Regional training course on "Genetics of Parasite Resistance in sheep and goats: Application of Genomics and DNA marker information to improve small ruminant breeding" at Seibersdorf, Austria with 20 participants from 12 countries. Apart from regional training courses, one national training course on "Tools for genetic evaluation and selection for breeding Alpacas" was implemented in Peru with participation of 44 professionals from different parts of the country.

The Joint Division organized two expert meetings to develop guidelines and support phenotypic characterization for enhanced genetic resistance among indigenous sheep in Latin America: (i) Experts meeting on "Development of guidelines for recording phenotypes in breeding sheep to enhance resistance to gastro-intestinal parasites" and (ii) Experts meeting on "Preparation of a manual for genetic evaluation and selection of small ruminants for breeding to enhance resistance to gastro-intestinal parasites".

Strategic Priority Area 2: Sustainable use and development

The Joint Division continued to provide FAO and IAEA Member States the much-required technical support on sustainable management, utilization and improvement of animal genetic resources through various IAEA national and regional Technical Cooperation projects (TCPs). Particularly, emphasis was given to improve animal identification, performance data recording and artificial insemination network in Africa, Asia and Latin America. Animal identification toolkits were provided to member countries following ICAR (International Committee on Animal Recording) standards and guidelines. Each toolkit consisted of electronic readers, tag/bolus applicators and RFID based ear tags and/or boluses for identification of 500 animals. More than 10,000 RFID ear tags/boluses were supplied to 15 countries (Argentina, Bangladesh, Bolivia, Burkina Faso, Costa Rica, Cuba, Dominican Republic, Madagascar, Mauritania, Mexico, Paraguay, Peru, Sierra Leone, Togo, Uruguay and Venezuela) to enable identification of at least 500 animals per breed for phenotype recording. Madagascar is using the toolkit for animal identification and recording the growth and dairy performance of local Malagasy Zebu cattle while Burkina Faso is using the toolkit in a community-based breeding program for the improvement of native Zebu Peuhl cattle. Countries in Latin America are utilizing these toolkits to enable phenotype recording of parasite resistance characteristics in their local sheep.

Artificial insemination using frozen semen technology is an important means of multiplying superior germplasm for sustainable improvement of livestock productivity. To assist 8 countries in Africa and Asia (Benin, Burkina Faso, Cambodia, Cameroon, Eritrea, Madagascar, Mauritania and Togo) that have little or no local production of cattle semen, The Joint Division provided support in terms of equipment and supplies required for functional frozen semen laboratories. Technical support was also provided by the Joint Division to Bangladesh and Sri Lanka to enhance the scale of frozen semen and embryo production. This support was crucial to the national artificial insemination programs, as it helped these countries achieve significant gains not only in improving the scale of semen production, but also to conserve indigenous germplasm.

The Joint Division is currently implementing a Coordinated Research Project (CRP) on "Application of nuclear and genomic tools to enable for the selection of animals with enhanced productivity traits". The CRP is aimed at development and application of molecular genetic tools to evaluate, select and breed dairy cattle for rapid but sustainable improvement of milk productivity in member states. Ten research contracts (Argentina, Bangladesh, China, India, Kenya, Peru, Serbia, South Africa, Sri Lanka and Tunisia) have already been awarded. The first research coordination meeting was conducted with participation of all the ten research contract holders and experts from Austria, Kenya, Italy and USA. In 2017, the Joint Division organized an expert meeting on "Nuclear and nuclear derived techniques for early pregnancy diagnosis in cattle". AGE implemented seven national training courses (Bangladesh, Benin, El Salvador, Madagascar, Mauritania and Tanzania)

on artificial insemination, techniques for reproductive hormone estimation, animal identification, recording phenotype and performance data in cattle and small ruminants. A total of 111 professionals from these six countries were successfully trained. The Joint Division also implemented a regional course on "Assisted reproductive techniques to enhance small ruminant productivity" in which 16 professionals from 9 countries participated (Argentina, Bolivia, Brazil, Costa Rica, El Salvador, Mexico, Paraguay, Peru and Uruguay) participated.

Strategic Priority Aria 3: Conservation

The Joint Division continued to maintain and enrich the Global Genetic Repository of Livestock at its Seibersdorf laboratories to help preserve genomic DNA from world animal genetic resources and promote collaborative research in developing countries. At present, the repository maintains about 8,500 DNA samples belonging to more than 130 breeds of various livestock species including cattle, sheep, goat, buffalo, pig, alpaca, chicken and guinea fowl.

Strategic Priority Area 4: Policies, institutions and capacity-building

Further, the Joint Division continued its efforts to improve the laboratory capacity of member states for management of animal genetic resources. Institutional and technical support were provided to eight countries (Bangladesh, Burkina Faso, Cambodia, Nigeria, Papua New Guinea, Peru, Sudan, Togo) for establishing or strengthening molecular genetic laboratories through provision of necessary equipment and laboratory supplies under the framework of national technical cooperation projects. The Joint Division experts also undertook field support missions to install equipment and conduct onsite training to laboratory personnel in many of these countries to put in place a fully equipped and functional facility for animal breed characterization. For example, the new molecular genetic laboratory in Burkina Faso was not only able to complete characterization of their native cattle and sheep breeds on their own, but also trained researchers from neighbouring Niger and Mali on animal breed characterization.

Aquatic genetic resources

Forest genetic resources

Plant genetic resources

The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture (AGE) supports Member States (MS) in implementing the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture through demand-based innovations that focus on the improvement and use of plant genetic diversity, thereby contributing to the UN Sustainable Development Goal 2 (end hunger, achieve food security and improved nutrition and promote sustainable agriculture). It supports the development and transfer of nuclear, physiological and molecular technologies that:

(1) increase genetic variation in food, feed or cash crops through plant mutation breeding,
(2) develop phenotyping tools that facilitate the selection of improved plant mutant lines, and
(3) enable the identification and use of molecular markers in crop improvement.

During the period of the Second Global Plan of Action for Plant Genetic Resources, **the Joint Division has been providing support to more than 30 Member States in the development and identification of improved mutant lines and varieties of plants for yield enhancement, yield stability under biotic and abiotic stresses, and for quality**. These Member States include Angola, Azerbaijan, Burundi, Burkina Faso, Bulgaria, Central African Republic, China, the Democratic Republic of Congo, Ghana, Indonesia, Iran, Cote d'Ivoire, Jamaica, Kazhakhstan, Kenya, Kuwait,

Lesotho, Madagascar, Malaysia, Mauritius, Malawi, Mozambique, Namibia, Nepal, Nicaragua, Oman, Qatar, Sierra Leone, Sri Lanka, Sudan, Togo, Tunisia, Uganda, Tanzania, Vanuatu, Vietnam, Zambia and Zimbabwe. The Joint Division is currently also contributing to Regional technical cooperation projects, specifically, RLA5068 (Regional Latin America), RAF5076 (Regional Africa), and RAS5077 (Regional Asia Pacific). Through these national and regional projects, the Joint Division is enabling technical and infrastructure capacity building while at the same time supporting the development of improved mutant lines and varieties of crops, based on the needs of Member States.

Towards research and development focusing on demand-driven innovation, the Joint Division is developing workflow processes that support the building of genotype-to-phenotype relations to enable marker development for accelerated genetic gain. **A pilot project on mutant sorghum populations with early maturity and short stature conducted whole-genome sequencing that led to the identification of about 5000 single nucleotide polymorphisms** and at least one larger structural change; determination of the closely linked causal mutation for the trait will identify markers that can be then routinely used for marker-assisted selection in shorter breeding cycles. Through this project the Joint Division is also establishing necessary processes and capacities for genome sequencing, resequencing, and bioinformatics.

In addition, through Coordinated Research Projects (CRPs), **the Joint Division is addressing the grand challenge of climate change, specifically, crop adaptation to climate change**. Increasing temperatures and uncertainties in the intensity, frequency and distribution of precipitation adversely affect crop production. These adverse effects are mainly due to the inability of existing crop varieties to cope with these climate anomalies, and because of increasing incidence and severity of pests and diseases, some of which are becoming transnational. **The Joint Division currently focuses on two CRPs aimed at crop adaptation to climate change:**

- ***D23032*** (Disease Resistance in Rice and Wheat for Better Adaptation to Climate Change);
- ***D23031*** (Improving Resilience to Drought in Rice and Sorghum through Mutation Breeding).

Two additional CRPs are also currently operational and address critical pathogens of important crop species:

- ***D25005*** (Mutation Breeding for Resistance to *Striga* Parasitic Weeds in Cereals for Food Security – *crops Sorghum and Rice*); and
- ***D22005*** (Efficient Screening Techniques to Identify Mutations with Disease Resistance in Coffee and Banana).

During the year 2018, **the Joint Division held the International Symposium on Plant Mutation Breeding and Biotechnology** (August 27-31, 2018), which was attended by over 300 participants from 77 Member States. The Symposium discussed the use of nuclear techniques to improve crop varieties to meet the global challenges of population growth and climate change**.** ***Member States presented important success stories in plant mutation breeding that led to crop improvement, increased national food production, and capacity development***. During the Symposium, the third edition of the "Manual on Mutation Breeding", published by the Joint Division in 2018, was also distributed.

The Joint Division continues to curate and maintain the Mutant Variety Database. The database collects and presents information on plant mutant varieties released officially or commercially worldwide. It provides data on the mutagen and dose used, the plant characteristics or traits that have been improved, and any related agronomic performance information that is available. **Currently, the database holds records on 3283 mutant varieties, with about 200 from the Asia-Pacific region waiting to be loaded.**

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Invertebrates (including insects, spiders, worms)

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Regulating and supporting ecosystem services

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*
- Explanatory notes for subsectors of GRFA to complement the ABS Elements
- Use of "digital sequence information[13]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

For Animal Genetic Resources

The Joint Division continued to extend support to Member States in generating and applying genetic sequence information for characterization, breeding and sustainable improvement of locally available livestock breeds. Particularly, technical support was provided to generate multi locus genotype data (>3,500 animals), partial sequence data (>2,000 animals) and genome-wide data (>750 animals) to enable Member States in developing baseline information, marker assisted breeding and genome-wide association studies in indigenous livestock. Further, The Joint Division developed a database application called "Genetics Laboratory Information and Data Management System (GLIDMaS)" to enhance Member States' capacity in efficient handling, management and utilization of genetic data.

GLIDMaS is a stand-alone application designed by the Joint Division to support and manage animal genetic laboratories worldwide. One of the major objectives of developing GLIDMaS is to assist animal geneticists working in developing countries to manage large volumes of molecular/genomic data (DNA sequence and genotype data) intended for animal selection, livestock biodiversity conservation and genetic improvement. In addition, GLIDMaS allows users to manage their genetic repository, DNA marker tools, genetic and genomic resources (radiation hybrid panels, oligos, etc.).

The Joint Division transferred the database application to 17 countries (Argentina, Bangladesh, Bolivia, Brazil, Bulgaria, Burkina Faso, Costa Rica, Cuba, Dominican Republic, India, Mexico, Pakistan, Paraguay, Peru, Sri Lanka, Uruguay and Venezuela) and practical training was provided to 30 participants from these countries.

GLIDMaS is expected to help member states in sustainable use of available resources, particularly the molecular genetic (sequence and genotype) information for characterization and breeding of indigenous farm animal breeds.

[13] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

For Plant Genetic Resources
The Joint Division has recently established a workflow and capacities that facilitate whole-genome sequencing and bioinformatic analyses. A pilot project on sorghum, an important food crop especially in Africa, focused on the measurable traits of early maturity and plant stature to develop molecular markers. Through this project a sorghum population including close to 500 individuals have been sequenced for bioinformatic analysis. The goal is to support Member States in developing and applying molecular marker technologies to plant mutation breeding for accelerated genetic gain.

- Review of work on GRFA and nutrition

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

Plant genetic resources

- Review of status and trends of seed policies

I. Nordic Genetic Resource Centre (NordGen)

Geographical coverage of of the instrument/organization

Finland, Norway, Sweden, Denmark, Iceland, Faroes Islands, Greenland and Åland Islands

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

NordGen Farm animals have role as a knowledge and a service center for all matters in Nordic farm animal genetic resources. No concrete AnGR collections are owned by NordGen nor is planned to be for the near future. NordGen Farm Animals aim is to be an initiative partner in AnGR relevant matters, also to have an active, coordinative role in relevant matters.

Aquatic genetic resources

We do not work with aquatic resources

Forest genetic resources

NordGen Forest addresses conservation and sustainable use of forest genetic resources, by being a forum for researchers, practitioners and managers working on forest genetics, seeds, planting stock and regeneration, and by facilitating the flow of scientific information and knowhow between these groups. No collections are owned by NordGen Forest.

Plant genetic resources

Holding an ex-situ collection of 35.000 different accessions of seed multiplied species relevant for food and agriculture and of Nordic relevans. Holding a small collection in-vitro of potatoes, 70 cultivars.

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

NA

Invertebrates (including insects, spiders, worms)

NA

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

NA

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

NA

Regulating and supporting ecosystem services

NA

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

NordGen Farm Animals section is planning to organise a workshop for the Nordic countries concerning the soon launched questionnaire on the status for implementation on the GPA by FAO. NordGen will resign for maintaining the Nordic Node for EFABIS/DAD-IS. Instead of that, we will concentrate on assistance and consulting the NCs of Nordic countries for updating their data to the EFABIS/DAD-IS. Our aim is to extract Nordic data from the system, evaluate and disseminate it together with NCs of Nordic countries.

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

NordGen is arranging regular meetings (twice a year) to the AnGR actors with Nordic countries (including NCs) in order to discuss all the relevant matters concerning AnGR, including ABS matters. NordGen Forest working group on genetic resources meet annually and will discuss topics of relevance to forest genetic resources, including to some extend ABS.

- Use of "digital sequence information[14]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

A long term goal is to set up a database which could serve as virtual biobank concerning all AnGR matters.

- Review of work on GRFA and nutrition

NordGen is involved in projects involving food and GRFA. However, the main focus is not nutrition.

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

NA

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

A status report on conservation of forest genetic resources in the Nordic region will be published during first half of 2019.

Plant genetic resources

- Review of status and trends of seed policies

NordGen administer a Public Private Partner Ship involved with prebreeding activities and sometimes getting into the area of seed policies. NordGen also holds some conservation varieties for public distribution.

[14] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

J. United Nations Environment Programme

Geographical coverage of the instrument/organization

Global

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

- Promote FAO indicators on genetic diversity of livestock which are part of Aichi Target 13 through the BIP
- Support Development and Application of Decision-support tools to conserve and sustainably use genetic diversity in indigenous livestock and wild relatives. Specific focus include: a) Enhanced Conservation & Management of Farm Animal Genetic Resources (FAnGR) using Decision support Tools (DSTs) and b) increased capacity & enhanced knowledge to use DSTs for conservation of livestock diversity at national & global levels in Bangladesh, Pakistan, Sri Lanka and Vietnam. The DSTs have been developed to identify and manage priority FAnGR, and to assess, strengthen and monitor the policies and market structures that support the conservation through utilization of FAnGR and their wild relatives for the benefit of human livelihoods. The tools have been applied through capacity-building and awareness-raising mechanisms that both emphasize the value (conservation and potential market return) of FAnGR and ensure that the tools are embedded in and used efficiently by institutional programmes and by poor livestock keepers.

Aquatic genetic resources

Forest genetic resources

Promote Access and Benefit Sharing of Forest Genetic Resources through valorisation of Medicinal Plants and value addition guided by Traditional knowledge (UNEP-GEF Projects on Access and Benefit Sharing in Congo Democratic Republic, Peru, India and Ethiopia)

Examples

- GEF ID 9926: Effective National Implementation of Access and Benefit Sharing (ABS) in accordance with the Nagoya Protocol and Valorisation of Botanical Plants (Medicinal, Cosmetic and Neutraceutical) in the Democratic Republic of Congo (DRC)
- GEF ID 8025: Effective Implementation of the Access and Benefit Sharing and Traditional Knowledge Regime in Peru in Accordance with the Nagoya Protocol
- GEF ID 3801: Strengthening the Implementation of the Biological Diversity Act and Rules with Focus on its Access and Benefit Sharing Provisions
- GEF ID 4091: Capacity Building for Access and Benefit Sharing and Conservation and Sustainable Use of Medicinal Plants

Supporting expanding the cultivation of fruit trees (*Tamarindus indica, Juglans jamaicensis, Azadirachta indica, Pouteria cainito, Cinnamomum chinense, Malpighia emarginata, Coccoloba uvifera*) and Neem trees in In Sierra del Rosario MAB Reserve in Cuba:

GEF ID 4158: “Agrobiodiversity Conservation and Man and the Biosphere Reserves in Cuba: Bridging Managed and Natural Landscapes”, Cuba;

Plant genetic resources

Promote conservation and sustainable use and mainstreaming of:

- Traditional fruit tree genetic diversity of apricot (*Prunus armeniaca*), grape (*Vitis vinifera*), pomegranate (*Punica granatum*),pear (*Pyrus* sp.),almond (*Amygdalus* sp.), pistachio (*Pistacia vera*), and apple (*Malus* sp.);
- Improved and traditional crop varieties of economically and culturally important crops;
- Globally important crop biodiversity, in areas of high environmental instability and variability in the mountain agricultural production landscapes;
- Crop Wild Relatives;
- Tropical fruit tree genetic resources:two globally important tropical fruit species and their wild relatives (*Citrus* and *Mangifera*) and two regionally (South East Asia) important mangosteen (*Garcinia* spp), and rambutan (*Nephelium lappaceum*);

Promote conservation and sustainable use of Biological Diversity through the Implementation of the Cartagena Protocol on Biosafety contributing to Aichi Targets 13 and 14. Contributes to the inclusion of products of modern biotechnology in addressing abiotic and biotic stresses and its management in the use of plant, animal and microbial genetic resources

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Invertebrates (including insects, spiders, worms)

All species

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

All species

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Wild terrestrial plants, sea grasses

Regulating and supporting ecosystem services

Carbon sequestration, water-related services, pollination, soil fertility, Safe use of products of modern biotechnology (biosafety and food safety)

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

Provide Secretariat of the Biodiversity Indicators Partnership - through UNEP-WCMC
Contribute to the Agrobiodiversity Index (led by Bioversity International);
Assessing and mapping ecosystem services supporting food and agriculture;
Access and Benefit Sharing programme contributing to the Implementation of the Nagoya Protocol
Biosafety Programme contributing to the Implementation of the Cartagena Protocol on Biosafety (safe use of products of modern biotechnology in the conservation and utilization of genetic resources for food and agriculture) – including development of policy, legal and technical frameworks for the safe use of products of modern biotechnology;

UNEP lead the portfolio of GEF supported projects on mainstreaming agricultural biodiversity https://wedocs.unep.org/bitstream/handle/20.500.11822/26878/biodivers_production.pdf?sequence=1&isAllowed=y. Examples include: GEF ID 5483: "Enhancing livelihoods in rural communities of Armenia through mainstreaming and strengthening agricultural biodiversity conservation and utilization", Armenia; GEF ID 4158: "Agrobiodiversity Conservation and Man and the Biosphere Reserves in Cuba: Bridging Managed and Natural Landscapes", Cuba; GEF ID5403: "Conservation and sustainable use of agricultural biodiversity to improve regulating and supporting ecosystem services in agriculture production in Uzbekistan", Uzbekistan; GEF ID5137: "Mainstreaming agricultural biodiversity conservation and utilization in agricultural sector to ensure ecosystem services and reduce vulnerability", India; GEF ID 4464: "Integrating traditional Crop Genetic Diversity into Technology: Using a Biodiversity Portfolio Approach to Buffer against Unpredictable Environmental Change in the Nepal Himalayas", Nepal GEF ID 1902: "Development and Application of Decision-support tools to conserve and sustainably use genetic diversity in indigenous livestock and wild relatives", Bangladesh, Pakistan, Sri Lanka, Vietnam; GEF ID 4150: "Mainstreaming agrobiodiversity conservation and use in Sri Lankan agro-ecosystems for livelihoods and adaptation to climate change", Sri Lanka; GEF ID 1030 "Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services", India, Indonesia, Malaysia and Thailand; GEF ID 3010: "Conservation and Management of Pollinators for Sustainable Agriculture, through an Ecosystem Approach" Brazil, Ghana, India, Kenya, Nepal, Pakistan, South Africa; GEF ID 1025: "*In situ*/On-Farm Conservation and Use of Agricultural Biodiversity (Horticultural Crops and Wild Fruit Species) in Central Asia", Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan" GEF ID 1020: "In-situ Conservation of Crop Wild Relatives Through Enhanced Information Management and Field Application", Armenia, Bolivia, Madagascar, Sri Lanka, Uzbekistan

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

- Use of "digital sequence information[15]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

The conceptual elements are still in discussion for clarity and UNEP is actively engaged in the process

- Review of work on GRFA and nutrition

UNEP leads Biodiversity for Food and Nutrition (BFN) initiative - a joint implemented program with Bioversity International, FAO and the Governments of Brazil, Kenya, Sri Lanka and Turkey: http://www.b4fn.org/countries/. UNEP/GEF 3808 "Mainstreaming Biodiversity Conservation and Sustainable Use for Improved Human Nutrition and Well-being"

[15] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

This project is the first global initiative of its kind to develop and test a successful comprehensive, multi-sectoral approach to mainstreaming biodiversity for improved nutrition, linking evidence, policies, markets and awareness. The results including mainstreaming into food-based dietary guidelines, food procurement and school feeding programmes along with approaches to prioritizing biodiversity, generating evidence of nutritional value and novel policy support and incentives. The BFN approach is also central to future development of healthy, sustainable food systems.
Some of the recent BFN outputs include:
Mainstreaming toolkit: http://www.b4fn.org/the-mainstreaming-biodiversity-toolkit/
E-learning course: http://www.b4fn.org/e-learning/
Country policy briefs: http://www.b4fn.org/resources/publications/publication-item/policy-briefsnbsp/

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

Plant genetic resources

- Review of status and trends of seed policies

K. United Nations Educational, Scientific and Cultural Organization (UNESCO)

Geographical coverage of the instrument/organization

Global

Components of biodiversity for food and agriculture covered by the instrument/organization

General note:
UNESCO through its designated sites – biosphere reserves/BRs (areas solely under national jurisdictions) - implements the *in-situ* conservation of plant and animal genetic resources (incl. their distinctions per ecosystems – forest, aquatic and marine, …). This is one of BR's primary functions - in particular, in core areas which comprise a strictly protected ecosystem that contributes to the conservation of landscapes, ecosystems, species and genetic variation. As UNESCO's role is more normative, technical assistance and expertise providing to Member States (MSs) and their biosphere reserves, concise and comprehensive data on activities focused on genetic resources may be provided only by MS and/or directly by its biosphere reserve (s).

Biodiversity for food and agriculture is also pitched as a key component to address in the move by a number of high and middle income countries towards a bio-based industry or bio-economy with its vision for innovative green growth through the use of genetics and molecular biology techniques. UNESCO has been positioning itself to address the need to build institutional and human capacities to teach and research this area from a sustainable development and ethical perspectives. UNESCO centres of excellence (Category 2) in the area of both plant and marine biotechnology and microbiology will be a useful resource to tackle these initiatives. UNESCO also contributes its multisectoral assements on policies and capacity building activities through the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Animal genetic resources

See General Note above

Aquatic genetic resources

Idem

Forest genetic resources

Idem

Plant genetic resources

Idem

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

Idem

Invertebrates (including insects, spiders, worms)

Idem

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

Idem

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

Idem

Regulating and supporting ecosystem services

Idem

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

Cross-sectorial matters

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

N/A

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

N/A

- Use of "digital sequence information[16]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

N/A

- Review of work on GRFA and nutrition

N/A

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

N/A

Forest genetic resources

- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

N/A

Plant genetic resources

- Review of status and trends of seed policies

N/A

[16] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

L. International Union for the Protection of New Varieties of Plants (UPOV)

Geographical coverage of the instrument/organization

As of December 31, 2018, UPOV had 75 members covering territories of 94 States, as follows:

African Intellectual Property Organization[3, 5]; Albania[3]; Argentina[2]; Australia[3]; Austria[3]; Azerbaijan[3]; Belarus[3]; Belgium[1]; Bolivia (Plurinational State of)[2]; Bosnia and Herzegovina[3]; Brazil[2]; Bulgaria[3]; Canada[3]; Chile[2]; China[2]; Colombia[2]; Costa Rica[3]; Croatia[3]; Czech Republic[3]; Denmark[3]; Dominican Republic[3]; Ecuador[2]; Estonia[3]; European Union[3, 4]; Finland[3]; France[3]; Georgia[3]; Germany[3]; Hungary[3]; Iceland[3] ; Ireland[3]; Israel[3]; Italy[2]; Japan[3]; Jordan[3]; Kenya[3]; Kyrgyzstan[3]; Latvia[3]; Lithuania[3]; Mexico[2]; Montenegro[3]; Morocco[3]; Netherlands[3]; New Zealand[2]; Nicaragua[2]; Norway[2]; Oman[3]; Panama[3]; Paraguay[2]; Peru[3]; Poland[3]; Portugal[2]; Republic of Korea[3]; Republic of Moldova[3]; Romania[3]; Russian Federation[3]; Serbia[3]; Singapore[3]; Slovakia[3]; Slovenia[3]; South Africa[2]; Spain[3]; Sweden[3]; Switzerland[3]; The former Yugoslav Republic of Macedonia[3]; Trinidad and Tobago[2]; Tunisia[3]; Turkey[3]; Ukraine[3]; United Kingdom[3]; United Republic of Tanzania[3]; United States of America[3]; Uruguay[2]; Uzbekistan[3]; Viet Nam[3]

1 1961 Convention as amended by the Additional Act of 1972 is the latest Act by which 1 State is bound.
2 1978 Act is the latest Act by which 17 States are bound.
3 1991 Act is the latest Act by which 55 States and 2 organizations are bound.
4 Operates a plant breeders' rights system which covers the territory of its 28 member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom).
5 Operates a plant breeders' rights system which covers the territory of its 17 member States *(Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Senegal, Togo).*

Components of biodiversity for food and agriculture covered by the instrument/organization

Sectoral genetic resources for food and agriculture

Animal genetic resources

n.a.

Aquatic genetic resources

In order to know if the legislation of a UPOV member applies to algae, please consult UPOV Lex (https://www.upov.int/upovlex/en/).

Forest genetic resources

For forest trees, see "plant genetic resources".

Plant genetic resources

The mission of UPOV is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.

The UPOV Convention provides the basis for UPOV members to encourage plant breeding by granting breeders of new plant varieties an intellectual property right: the breeder's right. In order to obtain protection, the breeder needs to file individual applications with the authorities of UPOV members entrusted with the task of granting breeders' rights (www.upov.int/members/en/pvp_offices.html).

Associated biodiversity of relevance to food and agriculture

Micro-organisms (including bacteria, viruses, protists and fungi)

In order to find out if the legislation of a UPOV member applies to micro-organisms, please consult UPOV Lex (https://www.upov.int/upovlex/en/).

Invertebrates (including insects, spiders, worms)

n.a.

Vertebrates (including amphibians, reptiles and non-domesticated birds and mammals)

n.a.

Wild and cultivated terrestrial and aquatic plants other than crop wild relatives

n.a.

Regulating and supporting ecosystem services

n.a.

Policies, programmes and activities relevant to the prioritized themes of the Commission's Seventeenth Regular Session

Policies, programmes and activities of the instrument/organization relevant to the following themes:

1. ***Cross-sectorial matters***

- Follow up to *The State of the World's Biodiversity for Food and Agriculture*

The comments from the UPOV Office to the draft *State of the World's Biodiversity for Food and Agriculture* were submitted on June 1, 2018 to the Secretary of the CGRFA (see the Annex).

- Explanatory notes for subsectors of GRFA to complement the ABS Elements

UPOV has published a video "Using the UPOV system to benefit custodians of native wild germplasm in Argentina", which was developed by the INTA (Instituto Nacional de Tecnologia Agropecuaria), Argentina and which is available at https://www.upov.int/portal/index.html.en.
This video demonstrates how the UPOV system has provided benefits to custodians of native wild germplasm in Argentina.

- Use of "digital sequence information[17]" on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA

n.a.

- Review of work on GRFA and nutrition

New varieties of plants are an essential and sustainable means of achieving food security in the context of population growth and climate change. The availability of an increasing choice of healthy, tasty and nutritious food at affordable prices relies on new varieties that are adapted to the environment in which they are grown and which provide a viable income for farmers.

[8] See https://www.upov.int/edocs/pressdocs/en/upov_pr_118.pdf.

UPOV's mission is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society. In particular, new varieties of plants are an important means of responding to the challenges of a growing and increasingly urbanized population, climate change, parallel demands for food and energy production and evolving human needs.

[17] The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, *inter alia*, "genetic sequence data", "genetic sequence information", "genetic information", "dematerialized genetic resources", "*in silico* utilization", etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

The tremendous progress in agricultural productivity in various parts of the world is largely based on improved varieties, together with improved farming practices, and future food security depend on them. There is also a need to further increase food production in the years leading up to 2030. World population is anticipated to grow until 2050, and urbanization will continue. Therefore, the need for increased productivity in sustainable agricultural production will continue for the foreseeable future. New varieties of plants with features such as improved yield, resistance to plant pests and diseases, salt and drought tolerance, or better adaptation to climatic stress are a key element in increasing productivity and product quality in agriculture, horticulture and forestry, whilst minimizing the pressure on the natural environment. Due to the continuous evolution of new pests and diseases as well as changes in climatic conditions and users' needs, there is a continuous demand by farmers/growers of new plant varieties and development by breeders of such new plant varieties (Why do farmers and growers need new plant varieties?).

[9] See https://www.upov.int/about/en/faq.html#QS10.

Sectorial matters

Aquatic genetic resources

- Presentation of the finalized *State of the World's Aquatic Genetic Resources for Food and Agriculture*

In order to know if the legislation of a UPOV member applies to algae, please consult UPOV Lex (https://www.upov.int/upovlex/en/).

Forest genetic resources

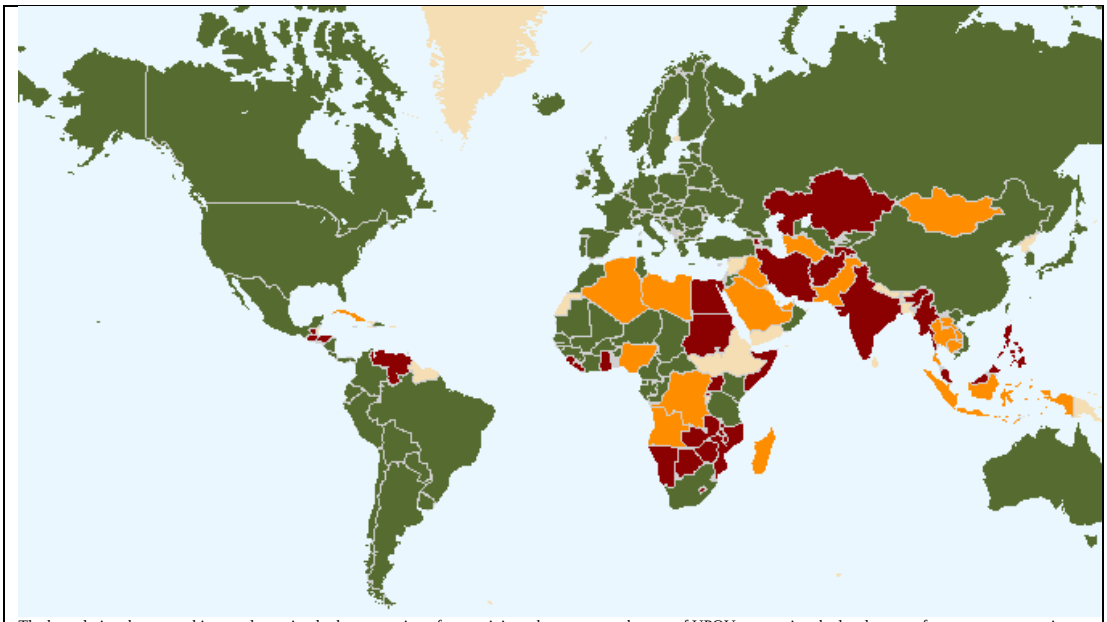
- Review of implementation of the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*

For forest trees, see "plant genetic resources".

Plant genetic resources

- Review of status and trends of seed policies

As of December 31, 2018, (i) UPOV had 75 members (shown in green), (ii) 17 States and 1 intergovernmental organization had initiated the procedure for acceding to the UPOV Convention (shown in brown), and (iii) 25 States and 1 intergovernmental organization which had been in contact with the Office of the Union for assistance in the development of laws based on the UPOV Convention (shown in orange).



The boundaries shown on this map do not imply the expression of any opinion whatsoever on the part of UPOV concerning the legal status of any country or territory.

The UPOV Report on the Impact of Plant Variety Protection demonstrated that in order to enjoy the full benefits which plant variety protection is able to generate, both implementation of the UPOV Convention and membership of UPOV are important. The introduction of the UPOV system of plant variety protection and UPOV membership were found to be associated with:
(a) increased breeding activities,
(b) greater availability of improved varieties,
(c) increased number of new varieties,
(d) diversification of types of breeders (e.g. private breeders, researchers),
(e) increased number of foreign new varieties,
(f) encouraging the development of a new industry competitiveness on foreign markets, and
(g) improved access to foreign plant varieties and enhanced domestic breeding programs.
In order to become a UPOV member the advice of the UPOV Council in respect of the conformity of the law of a future member with the provisions of the UPOV Convention is required. This procedure leads, in itself, to a high degree of harmony in those laws, thus facilitating cooperation between members in the implementation of the system. [12]

12 See https://www.upov.int/about/en/faq.html#QG50