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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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REPORT FROM FAO ON ITS POLICIES, PROGRAMMES AND ACTIVITIES ON AGRICULTURAL BIODIVERSITY:

(1) SECTORIAL MATTERS

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REPORT FROM FAO ON ITS POLICIES, PROGRAMMES AND ACTIVITIES ON AGRICULTURAL BIOLOGICAL DIVERSITY:

(1) SECTORIAL MATTERS

I. INTRODUCTION

1. The Commission regularly receives reports from international organizations, including FAO, on their policies, programmes and activities for the conservation and use of plant genetic resources. The Commission considers such reports to be of value, both for it and for the organizations, which are able to acquaint countries with their objectives and programmes, and benefit from their comments.

2. In 1995, by Resolution 3/95, Conference broadened the Commission's mandate to "all components of biodiversity of relevance to food and agriculture" and decided that the implementation of the broadened mandate should be "carried out through a step-by-step approach, beginning with animal genetic resources". The broadening has now been implemented for plant and animal genetic resources, but, as in the last session, this report provides information on the wide range of FAO's activities relevant to genetic resources for food and agriculture. It is in two sections: this section deals with crops; farm animals; forestry; fishery; soil biota; naturally occurring insects, bacteria and fungi relevant to integrated pest management; and micro-organisms of relevance to food processing. Cross-sectoral activities are covered in the other section: CGRFA-8/99/10.2. FAO's ongoing projects in the field of plant genetic resources are listed in document CGRFA-8/99/Inf. 8. Reports submitted by other organizations are in document CGRFA-8/99/11.

II. FAO ACTIVITIES IN 1997 AND 1998, AND FUTURE PROGRAMMES

1. Crop genetic resources

3. *Table 1* shows 1998-1999 Regular Programme budgetary allocations to the Plant Production and Protection Division of the Agriculture Department, with substantial crop genetic resources conservation and utilization activities, including staff salaries. These budgetary allocations support a number of components of the FAO Global System for the Conservation and Sustainable Utilization of Plant Genetic Resources. The relevance of each Programme Element to priority activities of the *Global Plan of Action* is indicated in each case.[1]

[1] A list of the *Plan's* priority activities is contained in document CGRFA-8/99/5, *Appendix 1, a*.

Table 1: 1998-99 budget allocations to Regular Programme elements with components relevant to plant genetic resources, and estimated weight of these components

PROGRAMME ELEMENT	BUDGET (US$ 000)	Estimated weight of PGR components	Relevant GPA Activity
Promotion of plant genetic resources programmes and capacity-building	1105	high	all
State of the World's Plant Genetic Resources	1123	high	all
Promotion of under-utilized genetic resources	434	high	12 and 14
Maintenance of biodiversity for difficult ecologies	293	medium	4
Optimization of diversified food crops production systems	1017	medium	11
Support to the International Rice Commission	541	low	11
Intensification and diversification of horticultural crop production	1023	medium	11
Industrial crop promotion for sustainable development	340	medium	12
Seed and planting material information and exchange	569	medium	13 and 18
Strengthening of national seed programmes	804	medium	13 and 15
Improved on-farm seed production	790	high	2 and 13
Implementation of the International Plant Protection Convention	2076	high	15
Integrated pest management	1969	low	2 and14

4. *Promotion of plant genetic resources programmes and capacity-building* supports national programmes and promotes international cooperation within the framework of the *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA)*. Various training courses and workshops were organized under this element: Training of Trainers for Women in Seed and Planting Material Production (three workshops, Cameroon, 1997/98, with Austrian support); Documentation and Data Management of Plant Biodiversity Collections (Poland, 1998, with the University of Birmingham, UK, the Nordic Genebank, the International Plant Genetic Resources Institute (IPGRI), and the Institute for Plant Breeding and Acclimatization for Eastern Europe); Molecular and Biotechnological Aspects of Sexual Reproduction of Higher Plants (Hungary, 1998); and Seed Production (Nigeria, 1998). The *Handbook for genebanks No. 5*, was published jointly with IPGRI, in 1997, with technical guidance on seed accession regeneration.

5. *Crop-related networks:* the *Global Plan of Action on Plant Genetic Resources* identified crop-related networks and regional networks on plant genetic resources as a priority activity. During 1997 and 1998, FAO supported and assisted governments to establish various global, inter-regional and regional crop-related networks, established in cooperation with national scientific organizations and FAO Regional Offices, which play an important role in promoting conservation and utilization of plant genetic resources for food and agriculture. A detailed list of the activities of individual networks is provided in document, CGRFA-8/99/Inf. 7.

6. *Promotion of under-utilized genetic resources* covers domestication, and the preservation of wild harvested, or little cultivated species, including under-utilized Andean species, lesser known cacti, local traditional fruits and vegetables in Asia, wild rice, and the African shea nut. It

supported the International Centre for Under-utilized Crops (ICUC), in the publication of its first official newsletter and webpages. A joint CD-ROM, the *New crop compendium*, was produced with Purdue University.

7. *Maintenance of biodiversity for difficult ecologies* focuses on increasing the production of natural grasslands. Working Groups have been established for different agro-ecological zones. Native germplasm was evaluated, and training courses and adaptation studies under small-farm conditions were carried out in the Himalaya Region, South East Asia, the Campos Region of Latin America, East Africa, Patagonia and Eastern Europe. Pasture improvement, with medicago varieties suited to harsh winters, and adaptation studies of Mediterranean grasses, were undertaken in Chile.

8. *Optimization of diversified food crop systems* focuses on the enhancement of food crop production efficiency, while maintaining natural resources, primarily through information and advice to national programmes and development partners on improved technologies. Support is also given to networks - TAMNET (Tropical Asian Maize Network), MED-Rice (Inter-Regional Co-operative Research Network on Rice in the Mediterranean areas), INTAFOHR (International Task Force on Hybrid Rice), and WEDEEM/IVS (Weltand Development and Management Network/Inland Valley Swamps) - and working groups – the Andean Crops Working Group, the Barley Working Group for Latin America, and the Working Group on Hybrid Rice in Latin America (GRUTHA). Preparation of a Rice Data Base is well advanced and a maize data base has been initiated. Books on maize and wheat, and studies of two Latin American agro-eco-zones, will be published in 1999.

9. *Support to the International Rice Commission* provides the secretariat of the International Rice Commission, and has promoted the collaborative development and use of hybrid rice and rainfed lowland/swamp rice, especially WARDA's *Oryza sativa* and *O. glaberima* hybrids. The Commission secretariat has helped to compile and disseminate information on rice, in various agro-ecologies. The Nineteenth Session (September 1998) expressed appreciation for the Commission's recent work, especially on hybrid rice development, and rice yield gaps and yield plateau issues.

10. *Intensification and diversification of horticultural crop production* promotes fruit, vegetable, and root and tuber crop improvement programmes, through selection and breeding and enhanced plant multiplication systems, and encourages the wider use of adapted and productive varieties, often through crop-related networks. In 1997, the FAO International Cooperation Network on Cactus Pear published *Descriptors for Cactus Pear.* The development of a horticultural variety information bank was initiated in 1998.

11. *Industrial crop promotion for sustainable development* introduces biotic tolerance to adverse ecologies, as novel crops (such as salt-tolerant samphire), new cultivars (such as drought-tolerant safflower and sweet sorghum), and new varieties (such as the cold-tolerant oil palm), and supports the *ICMAP newsletter,* and promotional activities for the conservation and cultivation of hitherto wild harvested medicinal and aromatic plants.

12. *Seed and plant material information and exchange:* The Seed Information Exchange Unit in 1997 and 1998 distributed 575 seed samples, and helped to identify local and adapted varieties to rehabilitate agricultural production, following disasters.

13. *Strengthening of national seed programmes* assists governments in formulating and implementing national seed policies. Smallholders, particularly in poor or remote regions, are assisted to adopt appropriate seed and planting material production, processing, quality control, storage and distribution technologies.

14. *Improved on-farm seed production* helps farmers to acquire skills for quality seed production, selection, harvesting, conditioning, storage and distribution, and aims to ensure seed security, for food security and the conservation of agro-biodiversity. A Regional Meeting on Seed Policy and Programmes was organized in Côte d'Ivoire, in 1998. Similar meetings are planned for Asia, the Near East and North Africa, and Latin America and the Caribbean.

15. FAO, with IPGRI organized an Informal Workshop in 1998 *on Genetic enhancement and base-broadening* to develop methodologies for priority setting. The proceedings will be published in 1999.

16. *The International Plant Protection Convention* (IPPC) covers phytosanitary measures to protect plant health against harmful pests, including in germplasm movement. The IPPC is the relevant international phytosanitary standard-setting organization in the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). The IPPC was recently amended, to reflect its role as forum for the international harmonization of phytosanitary measures. It recognizes the international movement of germplasm to be a critical phytosanitary concern, particularly for developing countries, with high dependence on introduced and improved crops. Publications include *Technical guidelines for the safe movement of germplasm* (prepared jointly by FAO and IPGRI), and *International standards for phytosanitary measures,* to facilitate international harmonization.

17. *Integrated Pest Management*: IPM is described under section 6 of this document.

18. Many field projects involve plant genetic resources activities. For example, the Mongolian national genebank, whose germplasm collection was threatened, was given assistance, and, in Angola, the emergency collection and conservation of crop germplasm, following hostilities, was supported .

19. Other projects focus on seed and planting material production and seed security programmes. For example, a regional network for strengthening on-farm seed and planting material production and management, and establishing seed security mechanisms in the Southern African Development Community (SADC) Region, was supported in 1997 and 1998; with Norwegian funds in trust, strategies are being developed to enable countries and rural farming communities to identify, acquire, multiply and deliver seed of locally adapted varieties, in disasters; a Regional Technical Meeting on Seed Policy and Programmes in Sub-Saharan Africa strengthened national capacities to produce, multiply and distribute good quality seeds, and varieties adapted to the regional agro-ecological conditions; and FAO and IPGRI, with funding from IFAD (International Fund for Agricultural Development) are developing strategies for *in situ* conservation of plant genetic resources for food and agriculture is underway in desert-prone areas of Mali and Zimbabwe.

2. Farm animal genetic resources

20. *Table 2* lists the major budgetary allocations within FAO's 1998-99 Regular Programme for the Animal Health and Production Division, with substantial animal genetic resources activities, FAO staff salaries included. Other programme elements, not listed here, support work on animal disease resistance, cross-sectoral technical and policy activity, and the development of FAO Specialized Information Systems (FAOSIS), such as the Domestic Animal Diversity Information System (DAD-IS).

Table 2: 1998-99 Programme of Work and Budget allocations to Regular Programme elements with components relevant to animal genetic resources, and estimated weight of these components

Programme element	Budget (US$ 000)	Estimated weight of AnGR components
Coordinating the country-base structure	493,5	High
Sustainable utilization and conservation *(in situ* and *ex situ*)	436	High
Characterization and early warning	395	High
Action strategy development and ommunication	238	High
Development of the ITWG-AnGR mechanism	424,5	High
DAD-IS development and maintenance	342	High

21. Regular Programme and extra-budgetary activities on animal genetic resources for food and agriculture directly support the further development and implementation, by countries, of a strategic framework for the conservation of animal genetic resources, and for the sustainable intensification of animal-based production systems.

22. Regular Programme resources support core activities of the global focus for the country-based Global Strategy for the Management of Farm Animal Genetic Resources, with complementary extra-budgetary support. FAO leads, coordinates and facilitates the step-by-step development of the Strategy with broad stakeholder involvement, and regular reporting, including on long-term in-kind and financial needs. Extra-budgetary resources are also needed for country and regional field activities within the Global Strategy, including preparation of the country-driven *Report on the State of the World's Animal Genetic Resources,* recommended by the Inter-governmental Technical Working Group on Animal Genetic Resources for Food and Agriculture (see document CGRFA-8/99/2).

23. A comprehensive framework for the Global Strategy was considered by the Committee on Agriculture (COAG), and supported by Council, in 1995. The *World Food Summit Plan of Action* further stressed the importance of developing and conserving animal genetic resources, in 1996. Decision III/11 of the Conference of the Parties to the CBD, in 1996, appreciated the importance of the country-based Global Strategy, and strongly supported its further development.

24. Key actions of the Global Strategy aim at:

- understanding, better using, and further developing animal genetic resources adapted to the world's major medium-input and low-input production environments, to sustainably intensify agricultural systems; and
- overcoming the threat of genetic erosion in the remaining 5,000 breed resources of the fourteen main farm animal species, about 30% of which are currently at high risk.

25. The Global Strategy contains four basic components, supported by cross-cutting capacity-building and technical assistance elements:

- Direct government guidance, through the Commission on Genetic Resources for Food and Agriculture.
- A planning and implementation enabling framework at country, regional and global levels, comprising: (i) focal points and networks, (ii) stakeholders, and (iii) DAD-IS.

- A technical work programme, to effectively manage animal genetic resources at country level, comprising: (i) national management plans; (ii) sustainable intensification; (iii) characterization; (iv) conservation; (v) communication; and (vi) emergency plans and responses.
- A reporting and evaluation component, to maximize the cost-effectiveness of country participation; support reporting at country, regional and global levels for the *State of the World's Animal Genetic Resources*; and provide an early warning function.

26. Cross-cutting areas of the strategic framework comprise:

- Capacity-building including: (i) training and education; (ii) comprehensive guidelines for country use; (iii) data and information management; (iv) technology transfer; (v) research; and (vi) coordination.
- Technical assistance, including: (i) FAO expertise; (ii) an informal panel of experts; (iii) cadres of experts; (iv) expert meetings; (v) advanced data and information software; and (vi) research.

27. The Global Strategy components are inter-dependent, and for cost-effectiveness and success, must be implemented concurrently, in a coherent manner, as human and financial resources become available, with the collaboration of all stakeholders, through the Initiative for Domestic Animal Diversity (iDAD).

28. Since 1995, this programme has achieved the following:

- The technical rationale for the Global Strategy was endorsed by an Informal Panel of Experts, representing a broad range of disciplines.
- The basic country-level structure is being established: governments in 93 countries, in Africa, Asia, the Americas, the Near East and Europe, are identifying National Focal Point Institutions, and National Coordinators, although most are not yet fully active.
- The importance of regional and national focal points for the effective management of animal genetic resources has been repeatedly stressed.
- A pilot regional focus, funded by the Government of Japan, was implemented in Asia. Efforts are underway to fund a second stage, for the Asia and Pacific Region.
- A regional focus for fourteen Southern African countries has been established, in collaboration with the Southern African Development Community (SADC), with UNDP funding. Funding for complementary activities comes from the Norway-supported project, "Integrated Support to Sustainable Development and Food Security". Preparations are underway to establish Regional Focuses for Western and Eastern Africa, with initial support from UNDP and UNEP, and for the Americas and the Near East, making use of existing country-driven regional structures, in order to ensure full involvement of the governments of the region, and continuity. France has provided initial funds for a Regional Focus for Europe, temporarily hosted by the Genetic Resources Bureau.
- DAD-IS will be implemented in four stages, the second of which has been implemented, in various languages, on the Internet, and off-line on CD-ROM. DAD-IS is an advanced, country-secure communications and information tool and a "virtual structure" for countries in developing and implementing their strategic frameworks for animal genetic resources management. There are currently about 1,000 regular users. A considerable further investment of human resources is still needed to fully enable DAD-IS.
- Comprehensive country-level guidelines for developing and implementing action plans for each farm animal species, and for the range of primary agro-ecosystems incorporating livestock, are under development, covering the key areas of characterization, sustainable use and development, and conservation. Some guidelines have been distributed, assisted by UNEP, and through DAD-IS Stage 2, for field testing; and a pilot, graphic, decision-

support system, to greatly simplify the use of the guidelines, is ready for testing, before development as a DAD-IS module. The International Committee on Animal Recording has collaborated in developing some of these guidelines.

- Mechanisms are being developed for stakeholders, including governmental and non-governmental international agencies and the private sector, to contribute actively to the development of the Global Strategy. An informal *Ad Hoc* Meeting of Donors and Other Stakeholders supported the Global Strategy, and agreed to incorporate it in their collaborative livestock activities.
- An Early Warning System is being developed, through global surveys of the important farm animals species, and the Global Databank for Animal Genetic Resources, within DAD-IS. The popular *World Watch List for Domestic Animal Diversity* has been published in English, French, and Spanish.
- A comprehensive, cost-effective communications strategy focuses on target audiences' information needs. As well as DAD-IS, and the *World Watch List*, it includes the *Animal Genetics Resources Information Bulletin*, a stakeholders' newsletter, and a briefing kit.
- Training for National Coordinators, utilizing DAD-IS and the Guidelines, has been conducted in all regions, wherever possible in association with other stakeholders, such as the European Association for Animal Production, the International Livestock Research Institute, the International Centre for Agricultural Research in the Dry Areas, and the International Trypanotolerance Centre.
- The Informal Panel of Experts has been reformed to be regionally representative and cover the broad range of technical areas involved in the management of animal genetic resources.
- Targeted research, aimed at improving knowledge, techniques and procedures, and building capacity at the country and regional level, has been stimulated. There is increasing acceptance of the importance of locally adapted animal genetic resources, for short and long-term food security and sustainable development.
- The Commission's first consideration of animal genetic resources, at this session, has been prepared through its Inter-governmental Technical Working Group on Amimal Genetic Resources (document CGRFA-8/99/2), and discussions at the Fifteenth Session of COAG (an extract from its Report is in document CGRFA-8/99/Inf. 4).

3. Forest genetic resources

29. *Table 3* lists the programme elements in the 1998-99 Forestry Department Regular Programme, in which substantial forest genetic resources activities are involved. Other programme elements including for wildlife protection and protected areas, such as natural parks, also have important forest genetic resources activities.

Table 3: 1998-99 budget allocations to Regular Programme elements with components relevant to forest genetic resources, and estimated weight of these components

Programme Element	Budget (US$ 000)	Estimated weight of FoGR components
Conservation of forest genetic resources	577	High
Plantation development and tree improvement	688	High

30. FAO provides technical and scientific support to member countries' national institutes in the conservation, management, sustainable use and development of forest genetic resources. The focus, in coordination with FAO's international partners, is on the transfer of information, know-how and technologies, through networking and twinning mechanisms. Activities on various aspects of forest genetic resources are described below.

31. *Exploration, collection, evaluation of forest genetic resources*, in collaboration with national institutes and international organizations, such as the International Union of Forestry Research Organizations (IUFRO), relevant Centres of the Consultative Group on International Agricultural Research, and other international partners, work on exploring, conserving and better utilizing forest tree genetic variation, focusing on socio-economically important species for the dry and humid tropics. Recent activities have concentrated mainly on the genera *Azadirachta* (neem) and *Swietenia* (mahogany).

32. *Conservation of genetic resources* actively contributes to elaborating forest genetic resources conservation methodologies, both *in situ* and *ex situ,* and coordinates the evaluation of practical experiences with *in situ* and *ex situ* conservation stands. The Danida Forest Seed Centre, Denmark, provides technical and financial assistance. The programme is carried out in partnership with participating national institutes. Assessments have been carried out on *in situ* conservation stands of *Tectona grandis* and *Pinus merkusii* in Thailand*, Baikea plurijuga* in Zambia and *Acacia senegal* in Burkina Faso, in 1997 and 1998. *Ex situ* conservation stands (mainly eucalypts and tropical pines) were evaluated in Kenya, Tanzania and Zambia in 1997, in Brazil in 1998, and in Côte d'Ivoire in 1999. In collaboration with IPGRI, other relevant CGIAR Centres, IUFRO and the DANIDA Forest Seed Centre, FAO is finalizing a practical guide on *in situ* forest genetic resources conservation.

33. *Wildlife, and protected area management* is part of the programme, *Forest Conservation, Wildlife and Contribution to Food Security*, managed by the Forestry Resources Division. The programme element promotes wildlife and protected area management systems and related institutional development and training. In 1998, advice was provided to countries of the Near East Forestry Commission (Jordan, Syria, Saudi Arabia, Turkey, Iran, Lebanon and Sudan) on institutional arrangements for protected areas. The training needs of countries in Western Asia were assessed in 1998. The programme is working on the sustainable utilization of wildlife for food and income generation. Studies, in particular in African and Latin American countries, have documented game husbandry techniques for the Paca *Agouti paca*, the Grasscutter *Thryonomys swinmderianus,* and other small mammals. In 1997/98, the programme provided technical support to 15 biological diversity conservation projects for surveys and management of wild fauna and flora. The programme also assists member countries to fulfil the requirements of international conventions, like CITES (the Convention on International Trade in Endangered Species of wild fauna and flora); RAMSAR (the Convention on Wetlands of International Importance Especially as Waterfowl Habitat); the Bonn Convention on Migratory Species (CMS), and the CBD.

34. *Information activities* has continued developing the World-wide Information System on Forest Genetic Resources (REFORGEN), to support policy and technical decisions for genetic conservation, at national, regional and international levels. It contains information provided by countries through questionnaires, complemented by four international workshops on forest genetic

resources, and data assembled in preparation for the Leipzig International Technical Conference. A user-friendly interface is being developed, to allow information retrieval through the Internet. Data and information will be regularly updated.

35. FAO annually publishes *Forest Genetic Resources* (in 3,800 copies). The bulletin and other relevant information have recently been posted on the Internet, and an FAO forest genetic resources home page established.

36. Under *International collaboration,* FAO works with IUFRO, CGIAR centres (notably IPGRI), the Centre for International Forestry Research (CIFOR) and the International Centre for Research in Agroforestry (ICRAF)), the CBD Secretariat's Clearing House Mechanism, universities and national forest research institutes. In March 1998, IPGRI, FAO and other partners, organized a regional training course on the conservation and sustainable use of forest genetic resources, in Ouagadougou, Burkina Faso. In August 1998, the Chinese Forestry Academy, with IUFRO and FAO, organized an international consultation on the contributions of genetics to the sustained management of global forest resources, in Beijing, China.

37. In March 1997, the FAO Committee on Forestry (COFO) reviewed a number of major forest policy issues, and "*agreed that there was a need to strengthen national regional and international activities in the conservation and sustainable use of forest genetic resources, to help enhance country capabilities and to support the exchange of information and know-how". "Some delegations were of the opinion that efforts to consider a global plan of action on conservation and sustainable utilization of forest genetic resources were premature. Other delegations suggested that FAO should pursue efforts to develop regional plans of action for the conservation and sustainable use of forest genetic resources as a first step to develop a global plan of action"*. COFO also noted that "*FAO, in conjunction with Regional Forestry Commissions and countries that request it, could convene regional and sub-regional forest genetic workshops complementary to those already held in 1995 for boreal and temperate zones*".

38. As a follow-up, FAO is supporting the organization of a series of sub-regional workshops on forest genetic resources, to assist countries to define priority species and needs, and elaborate coordinated regional action plans, focusing on a limited number of priority species and activities.

39. In collaboration with IPGRI, ICRAF and other national and international organizations, a sub-regional workshop, on the conservation, management, sustainable utilization and enhancement of forest genetic resources in dry-zone sub-Saharan (Sahelian) Africa, was organized in Ouagadougou (Burkina Faso), in September 1998, leading to the preparation of a sub-regional forest genetic resources action plan. A similar workshop is planned for the South Pacific in April 1999, in collaboration with the Australian-coordinated SPRIG (South Pacific Regional Initiative on Forest Genetic Resources) project, the Secretariat of the Pacific Community, and other regional partners. In late 1999, another workshop is planned for countries in Southern and Eastern Africa, under the auspices of the Southern African Development Community (SADC).

40. The Tenth Session of the Panel of Experts on Forest Gene Resources, 9 - 11 September 1997, made recommendations regarding the exploration, collection, testing and evaluation, exchange, conservation *in* and *ex situ*, and use of forest genetic resources (including breeding and the role of new biotechnologies in forest tree improvement), and updated the lists of priority and important species. Its *Report* (68 pp) is available to the Session on request.

41. FAO's forestry technical assistance projects include seed-collection, production, handling and exchange; tree-improvement and breeding; ecosystem and forest genetic resource conservation, *in* and *ex situ*; and the integration of genetic conservation into forest management practice and protected area management. During its Tenth Session, the Panel of Experts on Forest Gene Resources was informed about FAO's forestry field projects, many of which had forest genetic resource components.

4. Fishery genetic resources

42. *Table 4* lists the major budgetary allocations to programme elements in the Fisheries Department within FAO's 1998-99 Regular Programme budget, in which substantial fishery genetic resources activities are pursued, reflecting only activities directly related to fishery genetic resources, non-staff human resources allocations, but not FAO staff salaries.

Table 4: 1998-99 budget allocations to regular programme elements with components relevant to fishery genetic resources, and estimated weight of these components

Programme element	Budget (US $ 000)	Estimated weight of FiGR components
Promotion of responsible fisheries and aquaculture	1,700	Medium-low
Global monitoring and strategic analysis of inland fisheries and aquaculture	1,300	Medium-low
Increased contribution of inland water fisheries and aquaculture to world food supply	2,200	Medium-low
Improvement of biological data on marine resources	300	Medium

43. The Fishery Resources Division (FIR) is the lead unit for fishery genetic resources, with the most work handled by the Inland Water Resources and Aquaculture Service (FIRI), with assistance from the Marine Resources Service (FIRM), the Fishery Information, Data and Statistics Unit (FIDI), and the Fishery Development Planning Service (FIPP). The priorities concerning fishery genetic resources for 1997-98 and the future are directly linked to these programme elements. Information on these priorities provided to Members and others in specialized international forums; as guidelines, codes of conduct, protocols and technical publications (Fisheries Technical Papers and Circulars); in scientific publications and conference proceedings, and increasingly in the FAO *Aquaculture Newsletter* and the Fishery Department's internet site.

44. *Promotion of responsible fisheries and aquaculture* continues to support implementation of the FAO Code of Conduct for Responsible Fisheries, and the CBD, through activities, such as participation in CBD specialized meetings, publication of technical guidelines on fisheries and aquaculture (for example on the precautionary approach to the use of new species in aquaculture), and the organization of international forums on fishery genetic resources:

- The Bellagio Conference, convened in 1998, with the support of the Sustainable Development Department, and the International Centre for Living Aquatic Resource Management (ICLARM), that will provide guidance on policy development for fishery genetic resources.
- The first Regional Workshop of the Regional Programme for the Development of Technical Guidelines on Quarantine and Health Certification, and Establishment of Information Systems for the Responsible Movement of Live Aquatic Animals in Asia, organized in conjunction with the Network of Aquaculture Centres in Asia, and the Office International d'Epizootique (Bangkok, Thailand, January 1998).
- The *Ad Hoc* Expert Meeting on Indicators and Criteria of Sustainable Shrimp Culture (Rome, Italy, April 1998).
- The meeting on development of an information and communication system on aquatic animal diversity, organized in collaboration with the CGIAR's System-wide Genetic Resources Programme and the World Fisheries Trust (Rome, Italy, November 1998).

45. Activities under *Global monitoring and strategic analysis of inland fisheries and aquaculture* concern analysis of new farmed or fished species, and their underlying genetic resources. A specialized on-line and searchable Database on Introductions of Aquatic Species (DIAS) has been added to the Fisheries Internet site, with basic information on exotic species, and important issues. FAO Fishery statistics, data from DIAS, and information and illustrations from the Species Identification Programme have been incorporated into FishBase, a relational database distributed by ICLARM on CD-ROM. With the increase in number of genetically improved species and growing interest in genetic engineering, efforts are underway to document new techniques, and evaluate legislation required for sustainable use and equitable benefit-sharing. FAO statistics on capture fisheries and aquaculture provide valuable information on fishery genetic resources: efforts are underway to improve these data, through more accurate reporting, and inclusion of information on fish stocks and genetic resources. A fisheries global information system (FIGIS) is currently being designed, to integrate much of the information on fishery genetic resources.

46. The main activities under *Increased contribution of inland fisheries and aquaculture to world food supplies* involve the publication of technical documents, and consultations that document, characterize, and assess fishery genetic resources, and related technologies. For example, in collaboration with the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) a review of genetic technologies in the region was published, and work involving a survey of the private aquaculture sector is ongoing.

47. *Improvement of biological data on marine resources*: the Species Identification and Data Programme promotes the upgrading of marine fisheries data and reliable species identification, through publication of species inventories and diagnostic keys, reference systems and a readily accessible information system.

48. *Participation in inter-agency and inter-departmental activities* supports regional and national fisheries bodies, networks, and scientific associations, in promoting the sustainable use and conservation of fishery genetic resources. Principal external partners include the CBD Secretariat and its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), and CBD expert groups as appropriate; ICLARM, the International Network of Genetics in Aquaculture; the CGIAR System-wide Genetic Resources Programme; the World Fisheries Trust; and the Asian and American Fishery Societies. Internally, there is collaboration in inter-departmental working groups on biosafety, ethics in food and agriculture, biological diversity, inland water management, integrated coastal area management and integrated pest management.

49. A large number of activities have been undertaken, and outputs produced that relate to the sustainable use and conservation of fishery genetic resources. It is now time to incorporate this background information into planning a global strategy, elements of which will need to be developed, taking into account the domestic animal, crop plant, and forestry sectors, as well as the fisheries sector.

50. Relevant current field projects are listed in document CGRFA-8/99/Inf. 8.

5. Soil-biota, soil resources management and conservation

51. *Table 5* shows 1998-1999 Regular Programme budgetary allocations to the Agriculture Department, under which activities on soil biota and soil conservation take place, with estimated budget expenditures.

Table 5: 1998-1999 budget allocations to Regular Programme elements with components relevant to soil biota, soil resources management and conservation

Programme Element	Budget (estimated US$ 000)	Estimated weight of PGR components
International Cooperation and Liaison for Agricultural Engineering: Environment and Sustainability.[1]	75	Medium
Conservation farming component.[2]	70	Medium

[1] In the Agricultural Engineering Branch (AGSE). From 1999 these activities fall under the TP, Agricultural Engineering and the Environment.

[2] In the Soil Resources Management and Conservation Service

52. "Arable" agriculture based on tillage has, in the past, been associated with increased fertility, but leads to a long term reduction in soil fertility. Reduced mechanical tillage, through "conservation agriculture", appears the most promising approach to reversing soil degradation, and high sustainable production.

53. Conservation tillage is any tillage and planting system covering a minimum of 30 percent of soil surface with crop residue, after planting, based on managing several variants: soil cultivation, plant residues, cover crops, crop rotation and fertilizer practice. Ploughing or soil inversion are excluded; seeds are sown with minimal soil disturbance, and crop residues or cover crops increase soil biodiversity, improve and protect soil and enhance water storage and use, with high microbial activity and increased soil organic carbon. This reduces in the long term the need for synthetic pesticides and mineral fertilizer to a level below conventional farming, conserves and enhances the natural resources, and increases soil biota diversity, without sacrificing yields.

54. Activities in 1997/98 include a survey on the impact of motorized soil tillage in West Africa, and support for the Latin American Network for Conservation Tillage (RELACO). A workshop to exchange experiences between Latin America and Africa was held at the International Institute for Tropical Agriculture (IITA) in Nigeria in April 1997. In June 1998, an International Workshop on Conservation Tillage for Sustainable Agriculture was held in Harare, Zimbabwe, jointly sponsored by FAO, the German GTZ, the South African Agricultural Research Council (ARC) and the Zimbabwean Farmers' Union (ZFU). The workshop developed *Guidelines for environmentally sound tillage practices for the protection of soils*, which could lead to a *Code of Conduct for Sustainable Land Management*, as a world-wide policy instrument. In November 1998, the programme participated in a Conservation Tillage Workshop organized by the Animal Traction Network (ATNESA) in Namibia. Through Regular Programme TCDC arrangements, Brazilian and Colombian experts introduced Brazilian zero-tillage planters for animal traction.

6. Naturally occurring insects, bacteria and fungi relevant to Integrated Pest Management

Table 6: 1998-99 budget allocations to Regular Programme elements with components relevant to naturally occurring insects, bacteria and fungi relevant to Integrated Pest Management

Programme element	Budget (estimated US$ 000)	Estimated weight of GR components
Integrated Pest Management, including the GPPIS	1,969	Medium - High

55. *Integrated Pest Management* is an ecological approach, originally to crop protection, but increasingly to agroecosystem management, where agriculture and farmers' fields are viewed as complex, living systems. FAO has held a leading role in the development of IPM since 1966, when an FAO Panel first highlighted the potential of IPM and host plant resistance in food and fibre crops in developing countries. From the 1980s, FAO has executed a number of national and regional field projects, supported by a wide range of donors. Through these field projects, a vision of IPM developed that concentrates on empowering farmers in their communities. In fields, farmers interact with soil, water, plants and other living organisms, and understand and deploy their genetic and other resources, to manage optimally and conserve productive ecological processes and resources. In IPM, farmers become active experts in agricultural development.

56. IPM covers activities related to weeds, their population ecology and competitive relations with crops; insects, their biological control; and plant diseases, especially fungi, bacteria, and viruses, their population dynamics, evolution, and horizontal resistance strategies. The IPM Programme has hosted the creation of the internet Global Plant Protection Information System (pppis.fao.org), an interactive, international community of biologists who maintain data on thousands of taxa, including crops, insects, fungi, bacteria, weeds, and viruses, create and share knowledge communally. In 1998 over 3000 CD-ROMs of the database were also distributed around the world.

57. FAO's IPM Field Programme supports activities in Asia, Africa, Latin America, and the Middle East/North Africa. The Regular Programme supports regional officers and extra-budgetary resources, exceeding US$8 million in an average biennium, the bulk of field activities. The largest programme is the FAO Intercountry Programme for Community IPM in Asia, headquartered in Jakarta, Indonesia, which collaborates actively with national IPM programmes, NGOs, and other international networks, such as the Southeast Asian Regional Institute for Community Education (SEARICE), that support networks of farmers who conserve, select, and exchange locally adapted crop varieties. Over one million farmers, in over 75,000 communities in Asia, have set up Farmers' Field Schools, through which they assess, conserve, and enhance biodiversity in their agro-ecosystems, in particular of predators that regulate herbivorous pests.

58. In 1996, the Global IPM Facility was established, co-sponsored by FAO, the World Bank, the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP). FAO hosts the Global IPM Facility Secretariat with donor support. The Global IPM Facility assists governments and NGOs to initiate, develop or expand national IPM programmes, and develops and promotes international standards for effective participatory IPM. The Facility helps aid agencies identify assistance opportunities, and enhances communication, with donors and recipient governments. UNCED Agenda 21, the OECD Guidelines for Aid Agencies on Pest and Pesticide Management, and the CBD support this implementation model. The resultant momentum has created a breakthrough opportunity for expanding farmer-driven IPM to new countries and new crops. The Facility seeks to build on this momentum, and to help countries convert it into concrete activities.

7. Micro-organisms of relevance to food processing

59. Recently, the use of enzymes in food processing has increased, with enzymes derived from diverse individual sources, expressed through fermentation technologies using micro-organisms, in

some cases, allowing expression of large amounts of individual enzymes. In other cases, these technologies and genetic engineering are used to produce enzymes of relevance to food processing.

60. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) evaluates food enzymes, expressed by micro-organisms, and used in food processing. Specifications of identity and purity, and biological data of alpha-Acetolactate Decarboxylase and Maltogenic Amylase, were evaluated by JECFA, and *General Considerations and Specifications for Enzyme Preparations from Genetically Modified Microorganisms* were prepared at its Fifty-first Meeting, in June 1998.