GAMBIA:

COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES

(Leipzig,1996)

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Ministry of Agricultural and Natural Resources

Banjul, August 1995

Note by FAO

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CHAPTER 1
Introduction

The Republic of The Gambia covers an area of 1,114,700 ha. and is located on both sides of The River Gambia between 13o 35' and 16o 50' longitude west and 13o 12'and 13o 35' latitude north. With the exception of the western boundary bordering, the Atlantic Ocean, the country is completely surrounded by the Republic of Senegal.

The 1993 Population and Housing Census estimated the total population at 1,025 million persons with an annual growth rate of 4.2%. The urban population is estimated at 37.7% of the total population with a growth rate of 6.2%.

The country lies within a transitional zone between the dry northern Sudan and the moist southern Guinea zones. The climate is characterized by two distinct seasons. The cooler dry season which lasts from November to June, and the rainy season from July to October. The mean annual rainfall ranges from 1,200 mm on the coastal areas decreasing towards the eastern part of the country to approximately 800 mm. However, current figures are estimated at 8,748 mm. for the western, and 839.4 mm. for the eastern parts of the country.

There are two different physiographic units in The Gambia; the continental terminal plateau and the valleys along the river and its tributaries. The former is composed of highly weathered clayish sandstone sediments containing layers of porous iron pan, while the latter is composed of alluvial and colluvial soils which are generally fertile, except for the saline deposits along the river in the west.

The transition zone of the Guinea and Sudan zones contain elements of the moist tropical forest flora and that of southern Sudan-sahel. The decrease in precipitation particularly towards the east has a corresponding change on the vegetation in terms of the number of tree species and stocking density. Today much of the natural vegetation has been changed as a result of drought and human activities.

Agriculture, livestock and fisheries contribute significantly to the country's economy in both the external and internal trade. Forestry significantly contributes in providing energy, food, local medicine, construction material, furniture, habitat for a diverse variety of wild species and soil improvement.

The Gambia has a total forest land area of 453,400 ha. representing 45% of the land area. There are 66 gazetted national forest parks covering 32,729 ha. (3.3% of total land area) located on different parts of the country mainly on poor soils. In the early 1950s, few Gmelina plantations were established, mainly in the western division.

During the early days of forestry development, the forests were classified into two categories based on management objectives viz: a) protection forests and b) production forests. The management of plant and other natural resources is not limited to forestry department alone. For the protection forest areas, the management strategy was to gradually improve the forest by early burning and the prohibition of clearing for farming. Later, after the 1983 forestry inventory, the forest parks were divided into six categories:

- Open Forest (10.4%).
- Closed Forest (3.2%).
- Low Mangrove Forest (10.3%).
- High Mangrove Forest (3.0%).
- Savanna (73.2%)

The Management Strategy For The Production Forests Was To Protect The Economic Timber Tree Species For The Provision Of Fence Posts, Poles And Building Materials Particularly For Roofing.

Six protected Wild Life Management Parks covering an estimated area of 36,984 ha were created between 1976 and 1991. These are Abuko nature reserve (105 ha.) for the protection of a water catchment area with the associated remaining wild plant and animal species, the Kiang West national park of 11,000 ha. was established in 1987 to restore and conserve the natural habitats and indigenous flora and fauna. The Niumi/Sine Saloum national park (4,940 ha.) in the north - west part of the coastal areas of the country was also established to protect mangroves along this part of the coast. Other reserves include Baobolong Wet land reserve (20,000 ha.), River Gambia national park (570 ha.) and Tanji Bird reserve (400 ha.) established in 1993 to offer protection to the diversity of habitats such as Marine, estuary, freshwater mash, coastal dunes, mangroves, woodland savanna and thicket.

Due to financial and human resources constraints in the public sector, government with donor assistance introduced the concept and strategies of empowering local communities through the devolution of authority in natural resources management. A community forestry programme was initiated with assistance of GTZ on pilot basis. Currently, the potential community forest

area is estimated at 206,211 ha. These community forest areas are under the direct responsibility of the communities with limited advise and guidance from the forestry technical staff.

Food and Agriculture Organization(FAO) statistics (19??) indicate that the Gambia possesses approximately 250,000 hectares of arable and permanent pasture land with pastures forming 30 percent of this total hectarage. Traditional pastures are characterized by a dwindling carrying capacity, being able to support only 0.4 animal units per hectare at present. Forage production is clearly low and desirable species short-lived. It is therefore imperative that concerted effort be made to multiply, collect and conserve forage plant genetic materials. The numerous rice projects that benefit from irrigation could well benefit from the introduction of desirable forage species that not only enhances the carrying capacity but also extends the grazing season and provides a useful break in cropping patterns.

Several projects/programmes have been launched to address problems associated with stock feeding. These include the Mixed Farming and Resource Management Project, Pasture Improvement Programme and the Livestock Development Project. These programmes/projects had initiated activities aimed at collecting and storing plant genetic materials. Unfortunately, there is little to show for these activities. Collections and accessions have been left to deteriorate or simply abandoned. Efforts directed towards collection must be intensified at the national level as a matter of urgency.

CHAPTER 2
Indigenous Plant Genetic Resources

Past efforts in collecting and storing germ plasm material by Gambian agronomists, foresters etc. have not been systematic. Institutions such as ICRISAT and IITA have however complemented such efforts by organizing collection missions to the Gambia. Collections of sorghum, millet, groundnut and rice cultivars were carried out between the periods 1970 to 1994 (IITA Germ Plasm Mission Report; ICRISAT Germ Plasm Collection Mission to the Gambia Report, 1980).

Recent collection efforts for local cultivars from various geographic divisions in the Gambia were carried by the National Agricultural Research Institute (NARI). Samples of crop species collected include maize, sorghum and millet. These cultivars have been characterized so far as observed by farmers.

Quite recently too, Gambian Horticultural staff have also collected local cultivars of vegetables such as okra, hot peppers, tomatoes, sweet potatoes and cassava. Collections were done between 1983 to date.

In general, germ plasm collection in the Gambia has not been properly classified. The bulk of the germ plasm is being kept as seed (static conservation) by various organizations such as NARI NGOs and private farms. The extent of variability of early collection, by external missions is uncertain since most of the collections obtained have been done through selective and sometimes ad-hoc sampling procedures regardless of population structure.

Regarding the conservation of forest plant species, Forestry services were first created during the colonial days (1950s). The services were integrated within the department of Agriculture mainly for the protection and utilization of the forests areas and their products as well as the development of plantations. The legislation provided reservation of forest parks for regeneration, production, utilization and protection of forest resources. In this process the colonial administration placed particular emphasis on Rhun palm (Borassus aethiopium) and Bamboo (Babusa spp.) areas in recognition of the anticipated future dependency on these species for improved housing. Other major timber tree species such as mahogany (Khaya senegalensis), Iroko (Chlorophora regia) and others were equally protected (See Appendix 1).

Later in 1976, a Department of Forestry Services was created with a mandate of which forest conservation was considered as a high priority without loosing site of meeting the basic needs of the people.

However, no forest management plans were established for the individual forest parks until 1983 . The only exceptions were the gmelina plantations. In 1983, a national forestry inventory was conducted with financial and technical support from the German government through GTZ. As a result a land use classification was developed (See Appendix 2). A stand description in respect of tree species per hectare, percentage of stand with regeneration, density of regeneration as well as their silvi-cultural treatments were elaborated. Prior to this inventory, forest tree species were identified in three categories:

- timber tree species: all tree species which can be partly processed for sawtimber, firewood and other non-wood products,
- firewood species: tree species which produce firewood and other non-timber products but no sawtimber, and
- species of non-wood material (minor forest products) which have important use but would not produce firewood and/or timber.

The vegetation type is more related to edaphic factors and to a lesser extent with specific soil associations for some species. Areas of intensive cultivation are characterized by little or no woodland cover but with large and widely spaced tree species such as Parkia biglobosa, Bombax bunopozense, Khaya senegalensis, Acacia albida, adansonia digitata.

In the woodland areas, particularly in the western part of the country, the following species are common: *Daniellia oliveri, Khaya senegalensis*, (restricted to moist areas), *Pterocarpus erinacesus, terminalia albida, Parkia biglobosa, Prosopis africana, Philiostigma thonninginii, Combretum micranthum and Bumbax bunopozense*.

For the riparian woodland, the vegetation is generally more dense due to the increase in available moisture (higher water table). Trees on these areas grow to a larger size and these include *Khaya senegalensis, Detarium senegalensis, Pterocarpus erinaceus, Parinari excelsa, Dialium guineense, Parkia biglobosa, Erythrophyleum guineense, Elaesis gueensis, Terminalia albida, Cassia sieberiana* and *Lannia velutina*. Also present are common climbers and creepers such as *Landdolphia heudelotii* and *Saba senegalense*.

Disturbed woodlands with shrub under-storey: This is typically fairly open with trees seldom 15 m tall. The common tree species are: *Combretum micrantum, Terminalia albida, Cordyla africana, Cassia sieberiana, Oxytenanthera abyssinica and Sterculia setigera* (most common in the eastern part of the country).

Mangrove swamps are found on the banks of the River Gambia and its tributaries. The common species are Rhizophora racemosa and Avicennia africana. Most of the mangroves are for both domestic and artisanal uses. They also provide home and shelter for a variety of fish species.

The results of the forest inventory are sub-divided in natural forests and plantations and presented by division (See Appendix 3).

Another study conducted in 1979, addressed the importance of various plants found in the Gambia and used in traditional medicine mostly by the local communities. The report is based on information collected over one and a half years.

The status of all the forest types, as well as the individual tree species including mangroves, have to some extend been disturbed by man through his activities such as clearing for farming, creation of new farm lands, settlement and bush fires for both economic and social reasons. Cattle grazing also, has to some extend adversely affected the forest cover particularly the regeneration potential of most economic timber tree species such as pteracarpus, khaya, cordylia, afzelia etc. However, detailed current documentation on the status and the trend in the use of woody plant species is limited.

Following the 1983 inventory results, seven of the gazetted national forest parks were brought under management. Most of these parks are within the Western and Lower River Divisions. The management plan for each of these parks, made provision for the conservation of indigenous plant species especially those endangered species common on the site. More emphasis is placed on their natural rather than artificial regeneration. The conservation of some economically valuable timber tree species is promoted through enrichment planting. These seedlings, often raised in the nursery, include species like Antiaris africana, Afzelia africana, Albizia ferruginea, Anacardium occidentalale, Ceiba pentandara, Cordylia africana, Daniella oliveri, eucalyptus camaldulensis, Khaya senegalensis, Leucaena leucocephalia, Lophira lanceolata, Parkia biglobosa, Prosopis africana (provenicences of Gambia and Senegal), Pterocarpus erinaceus and Tectona grandis.

Species like Bush mango (*Cordyla africana*) and oil palm (*Elaeis guineensis*) provide a lot of by-products (fruits, palm oil, palm wine) than the primary use of the wood. Such species are therefore protected by the local communities particularly farmers. The combretum species, *Pterocarpus erinaceus* and *Terminalia macroptera* are (less susceptible or other wise more adaptive to annual bush fires) are also common on farm lands.

Other wild species with economic potential but not yet developed commercially include the following:- Wild yam (*Dioscorea praehensalis*), common edible leafy weeds (*Assia tora, Marselia senegalensis*), fruit trees (*Spondias monbiun, Zizyphus muretenia, Cordilia africana, Detarium senegalensis, Dialium guinense, Vitex doniana, Diosphyros mesphiliformis, Landophia spp., Parinari excelsa and Parinari macrophylla*) , medicinal (*Combretum micranthum*), food/medicinal (*Parkia biglobosa)*, and exotic - medicinal/insecticidal (*Azadirachta indica*). Some other wild flora grow naturally in nature reserves and such species include: *Adansonia digitat, Guiera senegalensis, Parinari macrophylla, Ceiba pentandra, Pseudospondias microcarpa, Detarium senegalensis, Dialium guineense, Lannea acida, Elaeis guineensis, Phoenix reclinata, Parkia biglobosa, Cola cordifolia, Vitex doniana, Calamus deeratus and Landolphia heudelotii*.

CHAPTER 3
National Conservation Activities

3.1 GENERAL

The Gambia does possess a small seed multiplication unit for agricultural crops at the Sapu Agricultural Research Station. This unit is mainly used for research purposes and in support of government programmes to the extent that it has remained largely under utilized. Presently, no commercial seed multiplication and marketing companies exist in this country. Thus, small agencies that handle seeds are mainly involved in the importation of seeds and re-packaging such imports into smaller units. In support of national seed programmes, the Ministry of Agriculture and Natural Resources has had to resort to buying seeds from Senegal or seek assistance from regional organizations.

Since the Gambia does not have a gene bank, modest conservation strategies have always been employed to maintain accessions for short-term storage. At both Yundum and Sapu research stations cold room facilities have been used with air conditioning provided. As such accessions have had to be maintained by annual planting in the field. Fortunately, though accession samples collected in the Gambia by ICRISAT AND IITA exist under long-term storage conditions in their respective gene banks.

With regard to forestry, until 1982, there were no reliable nurseries for seedling production. The first nursery established was chosen according to planned trials. The aim was to apply simple, safe and economic plant raising procedures which are adaptable and adoptable. Hence tree species which would demand a rather complicated or expensive breeding procedures were eliminated. The nurseries served the purpose of demonstrations, training and germination trials in addition to providing seedlings for planting. Seeds of the few exotic species planted are procured either by importation and /or collection from wildings mainly from the streets and compounds. Those of the indigenous species are mainly collected from identified mother plants located in different parts of the country and around Senegal. Much attention was paid to seed-trees with excellent phenotypical properties such as stem - form. In the absence of seed banks, it is some times very difficult to have reliable and good seeds especially where their is no security for the identified sources. Many of the best trees are often felled mostly illegally for timber or destroyed by bush fire.

Thus, the need for setting-up commercial growers that will deal with the conservation, multiplication and distribution of plant genetic resources needs to be addressed as a matter of urgency.

3.2 *IN SITU* CONSERVATION

By definition, *in situ* conservation simply means the conservation of ecosystems and natural habitats, the maintenance and recovery of viable populations of species in their natural surroundings. In the case of domesticated or cultivated species, these are maintained in the surrounding where they have developed their distinctive properties without destroying the habitat or ecosystem.

The Gambia over the years, in the area of forestry, designated some areas as protected areas to achieve specific conservation objectives. Generally these areas are managed by technical experts in the public sector. However, there is now a major shift towards the integration of local communities to take full responsibility for the protection and management of the remaining natural forests within their localities with the public sector providing only technical advice as needed.

In situ conservation could therefore be evident in the management of the natural forest parks and nature reserve areas. Harvesting of timber is limited to felling only mature and dead trees. Most of the parks are endowed with many of the protected timber tree species mentioned earlier. In most cases parent plants are identified from such environments for their propagation. Where cattle grazing and frequent fires are controlled, regeneration of a variety of species is apparent. Such species would include : *Borassus, Pterrocarpus, Ealias, Dialium, Ficus and Terminalia.* The middle and under storey is formed by the most dominant species mostly shrubs of the *Combretum* species. Thus, the forest management plan developed for the individual parks, provide room for in situ conservation. However, what may be lacking is the thorough monitoring of the potentials of these species in their natural habitats especially the parent plants. In the managed parks, tree propagation is by natural and/or artificial planting (enrichment planting) from nursery seedlings or direct sowing. Direct sowing was tested with Borassus, being a typical species that could be inconveniently raised in the nursery. However, other tree species with high nursery germination percentage were also sown directly.

The exploitation of fodder plant genetic resources is not regulated due to the open access regime which operates under the traditional system. The inability to match animal numbers with available forage which results in overstocking and subsequent overgrazing, together with periodic droughts, the expansion of cultivated areas, and annual forest fires are threatening the in situ conservation and survival of the forage plant genetic resources. It was within this context that the government of Gambia emphasized the formulation of programmes in the area of fodder and noted the need to regulate the extensive pastoral system. The plan proposed the herding of animals on land controlled by a group of village producers and the control of bush fires.

Several projects/programmes have been launched to address problems associated with stock feeding. These include the Mixed Farming and Resource Management Project, Pasture Improvement Programme and the Livestock Development Programme. These programmes / projects initiated activities aimed at collecting, storing and rehabilitating plant genetic material particularly in degraded rangelands. Such plant materials include the indigenous Andropogon gayanus and other introduced grass species such as Cenchrus ciliaris. Other leguminous grass species such as *Macrotyloma lablab, Aeschynomene* sp., *Stylosanthes* sp., *Vigna* sp, *Macroptileum attropurpereum* and two multipurpose trees- *Leucaena leucocephela* and *Cajanus cajan* were also tested under research conditions for both in situ and ex-situ conservation. Unfortunately, there is little to show for these activities. Collections and accessions have been left to deteriorate or simply abandoned, hence the need for forage crop plant genetic conservation.

3.3 *EX SITU* COLLECTIONS

Currently, there are no ex-situ conservation collection programmes for forest tree species. However, to a limited extent, this practice is common in the agricultural sector particularly germplasm collection activities undertaken by Research in collaboration with International Organizations such as IITA, ICRISAT etc. Seeds of both exotic and indigenous species for the forestry sector, when acquired are often stored in open wooden shelves under normal room temperature conditions before sowing. For agricultural crops, limited cold storage facilities are available for short term storage. Pre-treatment of seeds is done to speed up germination and/or to improve germination rate. Germination tests are also carried out before raising plants in large numbers.

Therefore, centralized storage would be appropriate so that all germ plasm materials collected could be stored under both medium and long term arrangements.

CHAPTER 4
In-Country Use of Plant Genetic Resources

Agricultural plant genetic materials collected, are used by agricultural research in screening programmes, varietal trials, multi-location testing and subsequently recommended for farmer use.

Over the years, research results have shown that indigenous materials in most trials excel in yield performance and stability. It is therefore proposed to further enhance the use of indigenous crop cultivars through crop improvement programmes pending the availability of funds.

The forestry sector's use of plant genetic resources is limited to the collection of indigenous and exotic species as earlier indicated, mainly for use in the re-afforestation and other tree planting programmes. Despite the absence of any systematic programme for the in-country use of improved plant genetic materials, two of the current forest policy statements: (1) to promote tree planting by private individuals for the provision of forest produce and wind breaks, and (2) to develop the economic use of forest produce by the local industry, are an indirect challenge to identify and recommend planting material and their sources.

National forest-tree seedling production is relatively low approximately 65,000 seedlings/year as compared to over 200,000 fruit tree production. Due to the GGFP forest park management activities, the production of native tree species seedlings compared to exotic species is currently high. Production of seedlings at the divisional nurseries is mainly for the annual national tree planting programme (seedlings distributed to villagers). Such planting material would include Psidium guajava, Anacardium, Eucalyptus, Gmelina and a limited number of indigenous tree species. Thus the use of native trees on a large scale is most common in enrichment planting programmes in both national forests and community managed forest parks. Such species would include Borassus, Cordyla, Detarium, Khaya, Parkia and Prosopis. Gmelina and Anacardium are commonly used for fire breaks in natural forest areas.

Modern Agro-forestry systems are not common with farmers, however farmers continue to practice their traditional system by leaving selected indigenous tree species on their farm lands. Such species include the following: Acacia albida, Borassus aethiopium, Cordyla africana and Parkia biglobosa. For the woodlot programme, much attention was given to Gmelina, Eucalyptus, Khaya and Anacardium.

Table 1. Use of tree species in national programme

Planting programme	Sources/ Nurseries	GGFP	Total
Forest Parks	21.6%	81.7%	46.8%
Woodlots	24.2%	-	14.1%
Schools	7.8%	-	4.5%
Private/individuals	46.4%	14.1%	32.8%
Research	-	4.2%	1.8%

Source: Regional Sahelian Forest Seed Programme- Forest Seed National Project Jan. 1989 Page 19.

4.1 USE OF FOREST GENETIC RESOURCES

In respect of seed production and supply, there is potential for collecting sufficient quantity of indigenous tree seeds. There are no nationally recognized seed sources, however the managed forest parks could serve as seed sources. Some of the un-managed parks and the open access forest areas with relatively good stands in respect of species diversity and population could equally be potential sources.

Seed collection in most cases is contracted to non-professionals in the villages with little or no experience in provenances, collection process, seed handling and storage for quality production. Nursery attendants would also collect seeds. Therefore the need for a better organized seed collection programme by specialized persons is a prerequisite to establishing a better seed source and genetic material for both in situ and ex-situ conservation. Other limitations associated to better plant genetic resource production include the following:

- limitations in the genetic base,
- lack of knowledge on the presentation and technology of seeds,
- difficulties in the collection and distribution of seeds,
- lack of trained technicians in proper seed collection and the absence of appropriate facilities for collection and storage.

In respect of the constraints identified earlier, there is a greater need for training , to improve the current technology, collection skills, distribution methods and research. Financial support is also required for the procurement of appropriate tools and equipment to improve nursery production, the establishment/ management of ex-situ seed stands, establishment of seed units, exploration, collection, importation and distribution of genetic material,

evaluation of provenances of some economic tree species for both timber and non-timber products and the improvement of selected populations.

CHAPTER 5
Policies and Legislation

In recognition of the urgency for the sustainable use of the nation's natural resources and maintenance of biodiversity, the government of The Gambia has declared its intention to encourage in-situ conservation by promulgating the Banjul Declaration, forest and wildlife Acts of 1977 and fairly recently ratified and became a member to the Conventions on Biodiversity, Climate Change and Desertification. The government of the Gambia in July 1992 further adopted the Gambia Environmental Action Plan (GEAP) as a framework of pivotal importance by committing itself to a sustainable management of the country's environment and, further supporting and strengthening the forest, wildlife and other resource related acts. In order to acquire the requisite authority to carry out its mandate to coordinate, evaluate and monitor, observe environmental regulatory codes and the facilitation of cooperation in the implementation of the GEAP, the National Environmental Agency(NEA) was created in 1993 under the Office of the President. The National Environmental Management Act (NEMA) of 1994 provides the legal framework for the implementation of the GEAP. These actions are clear manifestation of the importance government attaches to the maintenance of the ecosystems and natural habitats, the conservation and management of plant resources.

Even though forestry plays a significant contribution to the livelihood and financial development of many rural Gambians, as earlier stated, there is no formal national programme on plant genetic resources and its conservation. As such, there is no distinct policy statement and legislation in place for the collection, protection, promotion and improvement of plant genetic resources. However, the forestry policy to a lesser extent, implicitly addresses the need for resource conservation for the supply of services and products such as wood. The conservation of selected endangered species, is emphasized and implemented through the Forest Act and Regulations of 1977 and 1978 respectively. Different institutions such as Wildlife, Agriculture and Land and Surveys departments to a larger extent do not share common resource management policies. These to a larger extent, leads to duplication of efforts and conflicts over the use of common resources which is a bottle-neck to plant genetic resource conservation.

5.1 NATIONAL GOALS/PROGRAMMES

During the next 3 - 5 years, it is proposed to establish a Genetic Resources Unit which will carry out work on the collection, characterization, conservation and distribution of indigenous germplasm materials of the high priority crops such as Groundnuts, Early millet, Swamp and Upland Rice, Vegetables, Cotton and Forest Trees and shrubs. Emphasis will be given to high priority research areas such as varietal screening, plant protection aspects (including quarantine) and animal health.

The proposed Genetic Resources Unit will implement the following:

(i) Inventory of all available germ plasm such as Groundnuts, Early Millet, Findo, Vegetables, Swamp and Upland Rice, Cotton, Forest Species, Late Millet, Maize, Sorghum, Fruits, Sesame, Cowpeas, Irrigated Rice Bambara Groundnuts. This activity will be implemented within the first two years of the establishment of the proposed Genetic Resource Unit.

(ii) Establish a centralized storage facility within the first two years.

(iii) Germ plasm characterization using IBPGR Descriptors for the second and
hird year of establishment,

(iv) Establishment of *Arboretum* for both indigenous and exotic fruit trees, shrubs and perennial in the second and third year;

(v) Germ plasm collection, conservation, distribution, utilization and publication within the first five years; and,

(vi) Trials to address stand establishment problems such as

A. Drying time and seedling growth rate. Conductivity tests, to measure levels of seed vigour after drying;

B. Different harvesting times and viability of groundnuts and maize; and,

C. Monitoring storage conditions and viability on groundnuts, Early millet, maize, sorghum in year two.

Other areas of intervention will include the following:

(i) Collection and storage of vegetable germ plasm seeds and in-vitro materials.

(ii) Collection, characterization of accessions and storage of upland cereal seeds.

(iii) Collection, characterization and storage of grain legume seeds such as groundnuts, cowpeas and Bambara groundnut.

(iv) Collection, characterization and storage of upland and swamp rice seeds.

(v) Collection, characterization and storage of forage species such as:

(a) Legumes: *Stylosanthes Spp. (stylo), Vicia Spp, Glycine sp, Lab-Lab spp, Phaseolus sp, Vigna sp, Macroptibium sp, Cajanus sp, Pisum sp and Achyranthes sp,*

(b) Graminous Species: *Andropgan Sp, Brachiaria sp, Eragrotis sp, Pennisetum sp, Sorghum sp, Cynodon sp, Digitaria sp, Panicum sp. and Paspalum sp.*

(vi) Selection, collection, characterization, distribution and storage of forest tree species,

(vii) establishment of arboretum and herbarium of tree species and provenance trials for both exotic and indigenous species.

CHAPTER 6
INTERNATIONAL COLLABORATION

The need for international collaboration in plant genetic resources is imperative. The Government of the Gambia in realization of this need, signed the conventions on biodiversity, desertification and climate change. Subsequent to the signing of these conventions, the Government of the Gambia, initiated action in developing national plans of action and studies in desertification, climate change and biodiversity.

The International Livestock Center for Africa (ILCA) as part of the collaborative efforts trained three (3) animal scientists in forage evaluation techniques. Plant genetic materials have also been obtained through their gene bank for trial under Gambian conditions. Other research institutions and Non-Governmental Organizations (NGOs) have had access to other international institutions. There has been limited exchanges of materials from this country to other international organizations. Hence, there is the need to further develop a network to collaborate with relevant international organizations for the exchange of plant genetic materials and other related information.

It is being proposed that external linkages also be established and maintained with external organizations already carrying out strategic operational plans to collect, conserve and utilize plant genetic resources in the region and the world at large. These include IPGRI, ICRISAT, IITA, CGIAR, CYMMIT, WARDA and Sub-Regional Organizations such as CILSS and SAFGRAD.

CHAPTER 7
NATIONAL NEEDS AND OPPORTUNITIES

National needs and opportunities include the following:

- identification of national programmes for plant genetic resources conservation,
- identification of provenances by ecological zones and their variations for capturing a widely spread genetic variability of the primary and other secondary species,
- providing both government and international support to the existing National Environment Agency which is the national coordinating agent of all environment matters to coordinate the formulation of policies, that would promote both in-situ and ex-situ conservation, protection, usage, distribution and research of plant genetic material to increase availability and diverse usage,
- training to strengthen institutional capacity to provide improved working methodology for the assessment, collection, evaluation of provenances and research of both economic and non-economic plant species,
- support to the only institution (NARI) of higher learning to include and teach relevant courses for plant genetic resources improvement,
- creation and provision of means and facilities to increase awareness among farmers for the conservation of traditional plant genetic material, in particular the lesser known species commonly regraded as wild species,
- creation of market and storage facilities for some of the lesser known wild plant species especially those of food and/or medicinal values and their management by the local community,
- legislation on the conservation of plant genetic material to make reference to land and tree tenure concepts,
- organization of regional and sub-regional workshops and short term training programme to technicians on plant genetic material conservation and to cover all relevant areas including extension, information dissemination, research, seed handling, collection, storage, phytosanitary control, regional seed exchange programme, seed center management etc.
- organize workshops for decision makers and planners to facilitate their work in identifying national priorities, goals and strategies.

CHAPTER 8
Proposals for a Global Plan of Action

- A global financing mechanism should be set up for funding plant genetic material conservation especially in the tropics.
- A world center to be established that will preserve genetic material of all known and existing plants for future reproduction if need be.
- Establishment of seed banks in tropical developing countries.
- An International Convention on Plant Genetic Resource preservation and development.
- Establishment of a global forestry fund to be accessible by only the subscribers.

CHAPTER 9
Priorities

- Establishment of a networking system to establish what exist in terms of knowledge about plant genetic resources availability and what additional actions are needed at national, sub-regional and international levels,
- establishment of national and international structures for the preservation of plant genetic resources,
- identification of national programme for provenance trials,
- identification of market opportunities and storage facilities for a variety of food and/or medicinal plant species,
- formulation of legislation for the identification and conservation of plant genetic material.

CHAPTER 10
National Action

- Participate in exchange of plant genetic material,
- establishment of a national plant genetic bank in form of seed stands of both *in situ* and *ex situ*,
- establish national seed bank,
- sensitization of the local community to promote the conservation of plant genetic material particularly the lesser known species of greater commercial value.

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