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PLANT GENETIC RESOURCES IN AFRICA'S RENEWAL

POLICY, LEGAL AND PROGRAMMATIC ISSUES UNDER THE NEW PARTNERSHIP FOR AFRICA'S DEVELOPMENT

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EXECUTIVE SUMMARY

Africa's strength lies in its natural resources, including the genetic resources that are the foundation for growth and stability in agriculture, forestry and the environment. Africa's economies, cultures and political systems are primarily dependent, albeit precariously, on how well plant genetic resources are conserved and utilised. In the light of this, the continent's economic transformation and its ability to integrate itself into the evolving global system, to a large measure, depends on agricultural transformation that is based on plant genetic resources (PGR). The New Partnership for Africa's Development (NEPAD) launched at the Organization of African Unity (OAU) summit in Lusaka Zambia, July 2001 makes references to the role that genetic resources in general have played and will continue to play in the lives of African people as well as in the fulfilment of some of the principal elements of the programmes under the NEPAD. Because of their importance and the definite roles they play and will play in future, there is a need to ensure that genetic resources issues are placed firmly on the agenda of the NEPAD, the African Union (AU) and any other emerging regional or sub-regional initiatives. Since PGR form the basis of a dynamic, diverse and adaptable agriculture and thriving traditional medicine, they are fundamental to national health and food security. Their conservation and sustainable use must therefore be part of the region's developmental strategy.

Recognising and believing in the role of plant genetic resources, and the need to bring their conservation and sustainable use must be brought to the centre of dialogues and debates on Africa's future, the International Plant Genetic Resources Institute (IPGRI) and the African Centre for Technology Studies (ACTS) have embarked on a joint programme commencing with the organisation of a Roundtable on Plant Genetic Resources in Africa's Economic Renewal. The roundtable held on 2-3 April 2002 sought to identify and promote specific issues on conservation and sustainable use of plant genetic resources that should be part and parcel of the African Renewal process as well as the NEPAD's programmatic focus. It also sought to provide practical and technical components to the regional initiative and to facilitate more harmonious policy approaches to genetic resources conservation and sustainable use within the region, especially in agriculture, health, poverty alleviation and the sustainable economic development of the continent.

This background paper is intended to be a complement to existing and ongoing work in the field and formed the discussion document for the roundtable to facilitate more focussed discussion of the issues and to help policy makers and other key stakeholders achieve a greater consensus on the international and regional policy, legal, technical and institutional issues that should constitute a programme of action under the NEPAD and related regional initiatives. In this paper, we examine and critically evaluate the role of PGR in the life of Africans and the role that they play in achieving the goals of the NEPAD. A number of conclusions emerged from our analysis incorporating elements from the discussions and proposals of the roundtable. These led to several recommendations that are pertinent to policy and decision making involved in the PGR realm Africa-wide and in the implementation of the NEPAD.

A. THE ROLE OF PGR IN A NEW AFRICA

Agriculture and food security.

The NEPAD policy document states that: " The urgent need to achieve food security in African countries requires that the problem of inadequate agricultural systems be addressed, so that food production can be increased and nutritional standards raised".[1] This paper finds that the actual and potential role that genetic resources can play is not being fully brought to bear on agriculture and food production issues in Africa and it is here argued that in the absence of a comprehensive policy which takes into consideration the conservation and sustainable use of PGR, any initiatives taken with respect to boosting food security are for African countries only short-term and deficient. The agricultural sector is the largest source of employment and provides a high

percentage of export and foreign exchange earnings. Most economic activities are founded on agricultural production and export of raw materials with ever-increasing vulnerability to global trends and progressively declining ability to derive adequate benefits or extract maximum dividends from them.

Health and nutrition.

Plants and herbs have been used by man to cure diseases and heal injuries since time immemorial and in recent years, renewed interest has been growing in the use of medicinal plants as well as natural products. In a formal recognition and endorsement of Traditional Medicine as the most affordable and accessible form of health care for the majority of Africa's rural population, the Assembly of Heads of State and Government of the OAU at its 37th Ordinary Session and the 5th Ordinary Session of the African Economic Commission held 9 – 11 July 2001, Lusaka, Zambia, where the New African Initiative was also launched, declared the period 2001 – 2010 the OAU decade for African Traditional Medicine. Further, there are numerous under-utilised and neglected species with great potential for addressing problems of food security, nutrition and health that have not been given sufficient attention by the research and development sectors. There is a direct link between a balanced nutrition and a healthy and productive population and according to NEPAD, "the most obvious effects of health improvement on the working population are … the increase in productivity and the chance to secure better-paid jobs. Improvement in health and nutrition directly contributes to improved well-being... The link with poverty reduction is clearly established."[2]

Environment.

More evident, however, are the obvious roles that PGR play in respect to the environment and this is explicitly recognised by the NEPAD policy document which states in paragraph 176 that "Africa's biodiversity – including its rich flora and fauna and the rainforests – is an important global resource in combating the environmental degradation posed by the depletion of the ozone layer and climate change, as well as the pollution of air and water by industrial emissions and toxic effluents". It goes on to state further in paragraph 12: "Africa has a very important role to play with regard to the critical issue of protecting the environment. African resources include rainforests, the virtually carbon dioxide free atmosphere above the continent and the minimal presence of toxic effluents in the rivers and soils that interact with the Atlantic and Indian Oceans and the Mediterranean and Red Seas. **The** New Partnership for Africa's Development **will contain a strategy for nurturing these resources and using them for the development of the African continent while, at the same time preserving them for all humanity."** (emphasis supplied). The need, therefore, to articulate appropriate PGR policies and integrate them into the broader national plans and strategies cannot be over-emphasised.

Poverty alleviation.

The NEPAD policy document states that "improvement in agricultural performance is a prerequisite of economic development on the continent. The resulting increase in rural peoples' purchasing power will also lead to higher effective demand for African industrial goods. The induced dynamics would constitute a significant source of economic growth."[3] In this milieu, it is argued that PGR is and can be used as a veritable tool to address the problems associated with production levels, food security and poverty alleviation as well as health through better nutrition. Linked to this also are other benefits and not-so-obvious governance gains. It will reinforce the economic renewal process as farmers earn more income and facilitate better income re-distribution. Crucial also, and inherent in the poverty alleviation question, are gender issues as it has been established that women contribute significantly, in some cases more, to both household food and commercial crop production especially in rural communities.

Governance and peace

Shortfalls in food security invariably result in various inter-linked adverse conditions in a country's political and socio-economic system, and in a region that has suffered a long history of civil war and conflict, promoting region-wide oriented PGR programmes could be an instrument that can contribute to peace by stimulating fresh, while consolidating ongoing, political co-operation between the governments of the region and promoting social stability by ensuring that different sectors of the society benefit from access to, and can enjoy direct use of natural resources. There also appears to be a definite indication that a strong agricultural sector helps to create a stable society through the interplay in the income-nutrition-poverty reduction nexus, and will certainly help in addressing the very serious refugee problems that many countries in Africa currently face.

Scientific and technical research

NEPAD proposes "to promote cross-border cooperation and connectivity by utilising the knowledge currently available in existing centres of excellence on the continent".[4] This can only be effectively done if these centres of excellence are identified, their research activities ascertained, co-ordinated and directed towards addressing the existing and emergent problems in the relevant sectors. Invariably, scientific and technical research is key to achieving the objectives of the NEPAD and the Institutions of higher learning such as Universities as well as other Research Institutions could contribute immensely in that regard. For the fact that technological innovation and technology diffusion hold enormous potential for accelerating agricultural output and productivity, they could also serve as incubating grounds for innovation and pioneering practical solutions to both immanent and emerging problems particularly in the area of agricultural production, medicinal plants and PGR issues generally.

Market access, bioprospecting and regional trade imperatives.

The economies of countries in the region depend heavily on natural resources and they are exporters of predominantly primary products based on agriculture. Current global trade regimes are, without doubt, skewed against developing countries as they lack the capacity to compete effectively or take advantage of the opportunities they provide. Africa's future development and the sustainable utilisation of its immense natural resources will depend, to a large measure, on how these issues evolve and are managed. While the market potential at the community level for natural products is considerably high, global market for herbals, botanicals, and other natural products (including cosmetics, herbs and spices, industrial products – gums, resins, essential oils etc.) is also booming, and the market fundamentals suggest continuation of strong and growing consumer demands thus making bioprospecting an economic incentive for the conservation and sustainable use of genetic resources.

CURRENT CHALLENGES

The genetic base of Africa's plant diversity is however being seriously eroded, largely as a result of introduction of high yielding varieties and exotic species, climate change, socio-economic factors, natural disasters and armed conflict. The ongoing genetic erosion - the loss of genetic diversity - can also have important negative impacts on the rural poor. This erosion must be avoided since its counter productive to enhancing agricultural productivity and overall economic well being of the African nations. The loss of genetic resources has become phenomenal and is a major source of concern for the global community. However, the issues surrounding the use and conservation of PGR are complex and the international and local scenarios are quite compounded when the multiplicity of stakeholders are taken into account, their different claims, agenda priorities and the different interests they represent, spanning from governments, research communities through local communities, civil society to the private sector.

Responses in Africa to emerging issues relating to PGR have been largely reactive in nature rather than proactive, while long term strategic planning is virtually non-existent. African governments have, as a result, found themselves continuously responding to other parties' agenda rather than setting their own. However, it is observed that reasonable progress has been made in certain areas, reinforced by the collective regional approach adopted especially at the WTO arena.

RECOMMENDATIONS

In order to address the emerging issues outlined in this paper, the following programmatic thematic areas are proposed for incorporation into NEPAD.

Programmatic Focus 1:
Conduct a regional plant genetic resources assessment and foresight

This is a proposal to establish an African process to explore, identify, assess/study and build knowledge of the region's PGR. The process would generate a scientific assessment of plant genetic resources, including information on the genetic content of some of the region's plants. Its specific goals may include to:

- build an information base for better conservation and sustainable use of plant genetic resources;
- enlarge the range of plants used in Africa's agricultural and health systems;
- add value to the plant genetic resources — knowledge of them makes its possible for Africa to participate better in negotiating for benefits from scientific and commercial utilization of the resources;
- inform the region's scientific and technological research in such areas as pharmaceuticals, biotechnology and genomics;
- improve the quality of policies and laws on plant genetic resources;
- strengthen regional and national capacity in scientific exploration, survey and assessment of plant genetic resources
- inform the region's efforts to implement provisions of relevant international agreements.

Programmatic Focus 2:
Capacity building to improve Africa's participation in international negotiations and to domesticate the International Treaty on Plant Genetic Resources.

This is a proposal to establish a regional programme to build Africa's capacity to participate in future negotiations on plant genetic resources and to implement related international and regional agreements. The programme would amongst others aim at:

- improving Africa's understanding of the Treaty, including the development of an African guide to the Treaty;
- creating and enhancing skills for negotiating international agreements on issues of plant genetic resources, biodiversity and international trade;
- mobilizing Africa's expertise to participate in future negotiations;
- improving the capacity of African governments to formulate plant genetic resources policies and laws, including promoting the harmonization of plant genetic resources policies with those for development and trade;
- raising public awareness of the International Treaty on plant genetic resources and related agreements on biodiversity and trade;
- mobilizing for and directing skills to the implementation of such regional instruments as the OAU

model legislation on biodiversity and community.

Programmatic Focus 3:
Strengthening national and sub-regional plant genetic resources programmes

This is a proposal to create a NEPAD programme to strengthen national and sub-regional plant genetic resources programmes. Its specific goals would be to:

- improve financing of national and sub-regional plant genetic resources programmes
- build national and regional scientific and technical capacity for conservation and sustainable use of plant genetic resources
- establish and/or strengthen programmes for scientific and technical education and training in conservation and sustainable use of plant genetic resources
- develop and strengthen facilities for conservation and sustainable use of plant genetic resources
- promote networking between and among sub-regional plant genetic resources programmes

Programmatic Focus 4:
Creating sustainable financing for plant genetic resources activities

This is a proposal to explore and establish a regional mechanism for sustainable financing of NEPAD and other regional, sub-regional and national plant genetic resources activities. The proposed programmatic focus would involve:

- studying and assessing current financial status, mechanisms and instruments for plant genetic resources programmes
- assessing future financial needs for meeting plant genetic resources conservation, sustainable use and benefit- sharing goals
- identifying and promoting measures for improving African governments' financial contributions to plant genetic resources activities
- conducting a feasibility study to establish an African plant genetic resources Trust or Endowment Fund
- establishing long-term strategies and mechanisms for raising funds from domestic and international sources, including from private sector. This will include exploring how well debt relief to national governments can support plant genetic resources activities.

In the final analysis, we arrived at the conclusion that any proposal aimed at improving food and health security and promoting sustainable development must incorporate aspects of genetic resources conservation and utilisation because it will contribute not only to protecting the ecological richness and biological heritage of the region, but it could also act as a catalyst to:

- Improve quality of life;
- Alleviate poverty;
- Build a better economic future and technology diffusion;
- Foster regional co-operation;
- Preserve the region's rich cultural heritage; and
- Promote a new image of Africa internationally.

Consultative processes need, however, to be initiated to fully involve all sectors of the society, including the private sector, in a continuous dialogue with a view to effective implementation, monitoring and review of the programmes of action of the NEPAD.

I. BACKGROUND

Africa's strength lies in its natural resources, including the genetic resources that are the foundation for growth and stability in agriculture, forestry and the environment. Africa's economies, cultures and political systems are primarily dependent, albeit precariously, on how plant genetic resources are conserved and utilised. In the light of this, the continent's economic transformation and its ability to integrate itself into the evolving global system, to a large measure, depends on agricultural transformation that is based on plant genetic resources (PGR). It is estimated that over 70% of the continent's population resides in rural communities and derives subsistence and income principally from agriculture and biological resources, yet the economic policies, programmes and practices as well as the political institutions of many African countries have not fully captured or maximised the socio-economic potentials of these resources. The New Partnership for Africa's Development (NEPAD) launched at the Organization of African Unity (OAU) summit in Lusaka Zambia, July 2001 makes references to the role that genetic resources in general have played and will continue to play in the lives of African people as well as in the fulfilment of some of the principal elements of the programmes under the NEPAD.[5] Because of their importance and the definite roles they play and will play in future, there is a need to ensure that genetic resources issues are placed firmly on the agenda of the NEPAD, the African Union (AU) and any other emerging regional or sub-regional initiatives.

Recognizing and believing in the role of plant genetic resources and the need to bring their conservation and sustainable use must be brought to the centre of dialogues and debates on Africa's future, the International Plant Genetic Resources Institute (IPGRI) and the African Centre for Technology Studies (ACTS) have embarked on a joint programme commencing with the organisation of a Roundtable on Plant Genetic Resources in Africa's Economic Renewal. This roundtable was proposed to identify and promote specific issues on conservation and sustainable use of plant genetic resources that should be part and parcel of the African Renewal process as well as the NEPAD's programmatic focus. It sought among others to provide practical and technical components to the regional initiative and to facilitate more harmonious policy approaches to genetic resources conservation and sustainable use within the region, especially in agriculture, health, poverty alleviation and the sustainable economic development of the continent.

This background paper is intended to complement existing and ongoing work in the field and forms the discussion document arising from the roundtable to facilitate more focussed discussion of the issues and to help policy makers and other key stakeholders achieve a greater consensus on the international and regional policy, legal, technical and institutional issues that should constitute a programme of action under the NEPAD and related regional initiatives.

II. PLANT GENETIC RESOURCES (PGR) IN AFRICA

A. PGR in the socio-economic evolution of Africa

Africa's wealth of biological resources in general and plant genetic resources in particular, is a critical element in alleviating poverty, ensuring food security, and developing new medicines in addition to their immeasurable social and cultural value and significance. However, the rate of genetic erosion through loss of the species and varieties, currently alarming, has heightened the need to adopt more extensive steps in the conservation and sustainable use imperatives of PGR. Simultaneously, technologies which develop and make use of these resources outpace the ability of laws and societies to understand and cope with them. Spurred by technological advances, appreciation of the monetary and non-monetary value of genetic resources has grown, leading to increasing conflict over rights and responsibilities for these resources. Decision-makers, trying to devise good, coherent and consistent policy on genetic resources, are faced with a myriad of related, rapidly evolving issues being discussed in multiple national and intergovernmental fora (Bragdon & Downes, 1998).

Africa's economic, cultural, and social life has for decades centred around PGR while historical experiences and political direction have, in most cases, been driven or determined by issues relating to them right from prehistoric times through the colonial period to the post-independence era. The agricultural sector is the largest source of employment and provides a high percentage of export and foreign exchange earnings. Most economic activities are founded on agricultural production and export of raw materials with ever-increasing vulnerability to global trends and progressively declining ability to derive adequate benefits or extract maximum dividends from them.

Smallholder farmers and local communities in a wide range of agro-ecosystems within the region have developed viable agricultural practices and maintained numerous traditional plant varieties over thousands of years. These resources also provide significant educational, environmental, and scientific benefits. Modern crop improvement programmes and biotechnology, using these plant resources and their associated knowledge as the essential building blocks, have boosted productivity while raising new challenges. Africa has been a cheap source of plant genetic material for industrial change in Europe, Japan and the United States of America contributing significantly to the enhancement of agriculture and production of pharmaceutical products in these and other industrialised countries (Mugabe, 2001). Today many valuable chemical compounds have been extracted from African plants and trees for use in the pharmaceutical, nutraceutical and personal care products industries. Natural products have been recognised as having a key role to play in the healthcare delivery programmes in the region.[6] In a formal recognition and endorsement of Traditional Medicine as the most affordable and accessible form of health care for the majority of Africa's rural population, the Assembly of Heads of State and Government of the OAU at its 37th Ordinary Session and the 5th Ordinary Session of the African Economic Commission held 9 – 11 July 2001, Lusaka, Zambia declared the period 2001 – 2010 the OAU decade for African Traditional Medicine.[7]

Despite the fact that traditional medicine is dependent almost entirely on PGR as the source of its basic materials and products, the very system, practices and products which the African peoples have depended on for millennia are facing enormous threats from very many sources, not least of all, the globalisation process[8] as well as internal neglect. These linkages between PGR and economic and historical development are recognised, though by no means precisely articulated, in the policy documents of NEPAD. Since PGR form the basis of a dynamic, diverse and adaptable agriculture and traditional medicine, they are fundamental to national health and food security, thus their conservation and sustainable use must be part of the region's developmental strategy.

B. Socio-economic, political and environmental benefits of PGR

It is established that biodiversity plays an important economic, social, and cultural role in the lives of African people, particularly the local communities, while agriculture is the basis for all food production and is essential to food security and the livelihoods of the continent's millions of people. The exploitation of genetic resources has over the years contributed significantly in the development of African agriculture especially in the area of food crops. They are also an integral component of the traditional livelihood strategies of dryland populations. It is estimated that about 60% of the world' agricultural land is still farmed by predominately traditional or subsistence methods.

The NEPAD policy document generally recognises that Africa's biodiversity - including its rich flora and fauna and the rain forests - is also an important global resource in combating the environmental degradation posed by the depletion of the ozone layer and climate change, as well as the pollution of air and water by industrial emissions and toxic effluents.[9] In Africa, even dry lands, including many areas prone to drought and desertification, are particularly important reservoirs for plant genetic resources. Since genetic resources obtained directly from natural habitats, agro-ecosystems or ex situ genebank collections, are indispensable inputs for the breeding of modern crop varieties, this part of dryland biodiversity has a major regional and global significance. It has also been established that the development and sustainability of agriculture are strongly dependent on the access to plant genetic resources for food and agriculture,[10] and as a result, the urgency to address the issues surrounding access to genetic resources has increased in the last 20 years.

C. The value of genetic variability and diversity

In considering the value of plant genetic resources, not only the conservation of particular genes, and genotypes but also the conservation of variability or diversity per se needs to be taken into account. Genetic diversity is the basis for plant breeding and crop selection and therefore needs to be maintained. It helps in risk reduction while optimising the use of diverse resources as well as to respond to diverse situations and end-uses both at the macro and micro levels. It is also important for adaptation to changes over time – climatic and economic changes.

Plant genetic diversity, both at intra- and inter-specific levels, is therefore an integral part of their farming systems and its value can be distinguished in relation to the four functions of variability: -

- Genetic diversity helps to provide income and food security stability for farming communities at the local, national and global levels by smoothening yield variability through the maintenance of a wide range of crops and intra-crop diversity. Yield losses resulting from the failure of a particular crop or variety due to biotic and abiotic stresses are compensated for by yields of other crops and varieties. By using a wide range of locally adapted varieties, or mixtures of varieties, farmers are able to spread the risk of crop failure resulting from pest and disease epidemics or adverse environmental conditions such as drought.

- Farming systems based on diversity comprise plants with multiple uses, including diverse foods, fodder, fuel, medicines, gums and resins, construction material and timber. Moreover, the use of diverse crops and varieties is crucial from a nutritional perspective. Traditional vegetables and fruits that are often grown in home gardens, for example, provide valuable minerals, vitamins and amino acids making substantial contributions to health and nutrition.

- Genetic diversity provides insurance against future adverse conditions as needs are constantly changing. Hence genetic resources may later prove to provide useful characteristics, such as resistance to new diseases or adaptation to changing climatic conditions. It therefore provides a reservoir and a continuous source of genes for crop improvement and breeding programmes.

- Genetic diversity represents a “treasure chest” of potentially valuable but as yet unknown resources. This is the reason for maintaining both wild ecosystems and traditional farming systems, as plants in these habitats are likely to contain and develop new and valuable genetic characteristics as the evolutionary process continues.

Plant diversity also provides the essential raw materials for biotechnology, which of late has proved to be instrumental in not only in addressing issues relating to yields but also the nutritional value of a wide range of crops. The basic building blocks of biotechnology are genetic resources in the form of genes, genotypes, gene complexes, plants and crops and their varieties. Some of the claimed benefits of the transgenic plants are better weed and insect control, higher productivity and nutritional qualities and more flexible crop management although several safety and ethical questions have been raised in respect of its application. These benefits accrue primarily to farmers and agribusiness but there are also expected economic benefits accruing to consumers in terms of maintaining food production at low prices.

D. Status of Plant Genetic Resources

Africa has given the world some of its most important crops. The world’s major regions of crop diversity include the Ethiopian highlands, the Sahelian transition zone, the delta of the Niger River and the humid forest zone of West and central Africa. The highlands of Ethiopia are a centre of origin for coffee, and a centre of diversity for sorghum, lentil, wheat and barley. Tropical West Africa is a centre of origin for African rice (Oryza glaberrima) and a centre of diversity for oil palm, yams and cowpeas.

The genetic base of Africa's plant diversity is however being seriously eroded, largely as a result of the introduction of high yielding varieties and exotic species, climate change, socio-economic factors, natural disasters and armed conflict. The presence of diverse varieties in a field can help prevent devastation by pests or diseases. But over the past century, the traditional heterogeneous varieties have been displaced from farmers' fields by modern homogeneous varieties. Many farmers' varieties have been lost and a good number of those that remain can now be found only in gene banks, including those of the International Agricultural Research Centres. Away from farmers' fields, these varieties are unable to evolve and adapt to changing environmental conditions. The ongoing genetic erosion - the loss of genetic diversity - can also have considerable negative impacts on the rural poor. This erosion must be avoided since its counter productive to enhancing agricultural productivity and overall economic well being of the African nations. The loss of genetic resources has become phenomenal and is a major source of concern for the global community and the major driver for the conclusion of the several international agreements in this area, notably the Convention on Biological Diversity (CBD) and more recently the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR).

E. Causes of genetic erosion

As stated, PGR and the locally diverse food production systems are under threat and, with them, the accompanying local knowledge, culture and skills of the food producers. With this decline, agricultural biodiversity is disappearing and the scale of loss is extensive and with the disappearance of harvested species, varieties and breeds goes a wide range of unharvested species (FAO, 1996). The genetic erosion of agricultural biodiversity is also exacerbated by the loss of forest cover, coastal wetlands and other 'wild' uncultivated areas, and the destruction of the aquatic environment. This leads to losses of 'wild' relatives, important for the development of genetic resources, and losses of 'wild' foods essential for food provision, particularly in times of crisis (ITDG, 2001b).

The main cause of genetic erosion in crops, as reported by almost all countries signatories to the Global Plan of Action on plant genetic resources for food and agriculture (GPA) (FAO, 1998), is the replacement of local varieties by improved or exotic varieties and species. As old varieties in farmers' fields are replaced by newer ones, genetic erosion frequently occurs because the genes and gene complexes found in the diverse farmers' varieties are not contained in toto in the modern variety. In addition, the sheer number of varieties is often reduced when commercial varieties are introduced into traditional farming systems.

There are many other causes of this decline, which has been accelerating throughout the 20th century in parallel with the demands of an increasing population and greater competition for natural resources. Briefly, the principal underlying causes include:

- The rapid expansion of industrial and Green Revolution agriculture, intensive industrial production, (some production systems using genetically modified varieties and breeds) that cultivate relatively few crop varieties in monocultures.

- Globalisation of the food system and marketing, and the extension of intellectual property systems, which have led to the widespread cultivation and rearing of fewer varieties and breeds for a more uniform, less diverse but more competitive global market.

- Land degradation per se: as lands become eroded, deforested or salinized, dryland habitats and the biodiversity they support are destroyed.
- Climate change - this poses a threat to diversity as many plants are unable to cope or adapt to changing temperatures and moisture gradients caused by global warming and the associated change of climate.

- The breakdown of traditional systems of natural resource management with the parallel loss of local plant varieties, and associated cultural knowledge;

- components of agricultural development polices, including the displacement of traditional plant varieties by improved ones (ITDG, 2001b).

- Natural disasters, including droughts, floods and pests and diseases, which have led to widespread losses of diversity from both farmers fields and natural habitats

- Political instability and civil unrest that have led to loss of genetic resources in fields as farmers flee from war torn areas and as ex situ conservation facilities are destroyed

F. Intellectual Property Rights protection

Intellectual property rights (IPRs) are the rights given to persons over the creations of their intellect - their intellectual property (IP). They are granted by a state authority for certain products of intellectual effort and ingenuity. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time. The social purpose is to provide protection for the results of investment in the development of new technology, thus giving the incentive and means to finance research and development activities. The grant of IPRs involves a delicate balancing of the private rights of the information/technology generator against those of the society at large in having the information available. For instance, Patents, which are one class of IPRs, are conferred on inventors, subject to the requirements of novelty, non-obviousness (constituting inventive step) and industrial applicability. The protection is usually given for a finite term, typically 20 years in the case of patents (ITDG, 2001a). The fixing of terms of years for IPRs is predicated on the understanding that the IPR holder will have recouped their investment at the end of the duration thus justifying the freeing of the information/technology into the public domain.

The main IPR issues in PGR management include ownership, access and benefit sharing. The principal Intellectual Property Rights categories applicable to the utilisation of PGR are relate include to Patents, Plant Breeders Rights, Farmer's rights and Local Communities and Indigenous Communities Rights. More recently added to that is the class of PGR that are within the international public domain for which no IPR may be obtained under the ITPGR. At the international level, the principal instruments outlining IPR issues for PGR management are the Convention on Biological Diversity (CBD), the International Convention for the Protection of New Varieties of Plants (UPOV Convention), the International Treaty on Plant Genetic Resources (ITPGR) and the Agreement on Trade-Related Aspects of IPRs (TRIPS). The property rights recognised under these regimes range from stringent individual rights to farmers' and community rights. It is however noteworthy that the trend at the international level is towards individual rights and state rights. Community rights are not enforced with as much rigour as private rights and are, in most cases, not even legally protected by law.

The interaction between these different categories of rights and the relevant regimes has become the source of current tensions and intense international debate at different forums where they have arisen or are being addressed. These include the CBD, the FAO the WTO, WIPO and UPOV. These tensions became more accentuated by the conclusion of the agreement on Trade Related aspects of Intellectual Property Rights (TRIPs). The TRIPS agreement is the most exhaustive international IPR regime providing for minimum standards of protection for all forms IPRs. Article 27 specifically requires that patents be granted in all areas of technology implying that patents are applicable to technologies using PGR, Article 27.3(b) specifically, imposes an obligation on WTO members to apply them to protect plant varieties "by patents or by an effective sui generis system or by any combination thereof". In responding to this, countries now have to balance the rights of industrial innovators, often not from the country concerned, and the rights of local communities, farmers, indigenous peoples and consumers within the country (Williams, 1997).

Under the terms of the TRIPs agreement, several African countries ought to have, by now, brought their laws in line with its provisions while the rest have up till 2005 to do so, but very few have so far actually done so. The provisions of Article 27.3(b) allow members not to have patent regimes for plants, animals, other than micro-organisms, and biological processes for producing plants or animals. It does, however, require countries to provide some form of intellectual property protection for plant varieties. While this provision ought to have been reviewed in 1999, it has not been reviewed and is still a major source of concern and tension for all concerned.

In the light of this situation, countries need to consider a range of issues, options and capacity building requirements both for addressing the inherent issues as well as in preparation for this review. The review is part of a wider process that will determine what choices countries will have regarding access to, the sustainable use of, trade in, and benefits arising from the use of plants, animals and biological processes. The result of the review is likely to affect a nation's capacity to provide food and livelihood security for its citizens and will influence access and benefit sharing agreements with respect to genetic resources (ITDG, 2001a).

Significantly, African countries have not seized the opportunity to devise sui generis regimes, the alternative provided for under TRIPS, for the protection of plant varieties. This is so despite the fact that the OAU through its Scientific, Technical and Research Commission developed a model law with provisions covering breeders' rights that could serve as a starting point for developing national legislation. The flexibility accorded by TRIPS is an opportunity for countries to come up with a plant variety protection regime that is germane to their needs and conditions (Cullet, 2001). Some African countries such as Kenya have signed onto UPOV (1978 version) which has been promoted as a sui generis system instead of developing their own regimes.[11]

It is largely no longer debatable that contemporary IPR laws are generally inappropriate and inadequate for benefit sharing and defending the rights and resources of local communities and indigenous peoples (Nnadozie, 2001). By definition, IPRs as provided for under TRIPs and most domestic laws are individual, exclusive rights based on classical economic notions of property rights. Traditional or community knowledge, however, is usually shared and even the holders of restricted knowledge in communities generally do not have the right to commercialise it for personal gain as they are perceived as holding it in custody for the entire community. Moreover the benefits from that knowledge are not always in terms of economic rewards. The social aspect is critical in some instances. The focus in contemporary IPRs such as patents, on novelty, exclusivity and individual contribution precludes local collective or communal activity. (Kameri-Mbote & Cullet, 2000).

Currently, there are a number of models that are emerging to help local communities develop the basis of future legal systems to protect their knowledge and resources. These rights embody both biological and cultural rights and thus may go beyond other sui generis models (i.e. rights or legally recognised systems that are adapted to the particular needs of a country or community), which concentrate only on the biological resource (Posey and Dutfield, 1996). Some of these rights are embodied in the CBD, especially Article 8(j), as well as in the ITPGR, but have yet to be enacted in national laws in most countries though there are a number of models under consideration (see Posey and Dutfield, 1996). More recently, the Organisation of African Unity (OAU) has developed draft community rights legislation and some countries, Namibia for instance, are in the process of developing legislation, based on the model, that protects certain aspects of community rights.

The ITPGR, by recognising farmers' rights, highlights the contributions of farmers around the world in conserving and improving plant genetic resources and making them available. While acknowledging that the responsibility for realizing farmers' rights rests with national governments, the treaty asks governments to "take measures to protect and promote Farmers' Rights." Such measures include protecting traditional knowledge relevant to plant genetic resources, promoting farmers' rights to share equitably in the benefits arising from the use of genetic resources and to participate in national-level decision-making on matters related to their conservation and sustainable use.

III. NATIONAL AND REGIONAL INITIATIVES

A. Overview of national and regional responses to emerging international issues

The Convention on Biological Diversity (CBD) anticipates the implementation of its provisions through national legislation and policies, but since it came into force in 1993, controversy and disputes have trailed attempts to do so. Central among the thorniest aspects are the issues of access and equitable sharing of benefits derived from the exploitation of biological resources as well as the effects of other international agreements, especially TRIPs, on the CBD objectives as they relate to conservation and local community rights. Further challenges have also arisen as a result of the conclusion of the Biosafety Protocol and the need to formulate national policies and laws to implement its provisions (Kameri-Mbote, 2002). Although both the Convention and the Protocol stipulate the enactment of enabling legislation and the establishment of guidelines arriving at them has not been easy. So far, very limited action has been taken by way of practical implementation of those objectives, especially with respect to putting in place structures and mechanisms to facilitate their realisation (Nnadozie, 2001).

The recently concluded International Treaty on Plant Genetic Resources (ITPGR) adds a new dimension to the chequered international processes that developing countries, especially in Africa, have to contend with. While establishing an international/multi-lateral system, several components of the treaty still require action at the national level. For instance, the issue of Farmers Rights has to be dealt with by national legislation and policy. Most countries are still at a loss as to how to proceed in this regard even while the conceptual issues are still to be fully clarified. The Conference of Parties (COP) of the CBD had at its fifth meeting in Nairobi, 2000, adopted decision V/26, which in paragraph 7, "stresses that it is important that, in developing national legislation on access, Parties take into account and allow for the development of a multilateral system to facilitate access and benefit-sharing in the context of the International Undertaking on Plant Genetic Resources, which is currently being revised". But it is evident that in the few examples where attempts are currently being made to institute legislation governing access to genetic resources this has not been the case.

The situation is further compounded when the multiplicity of stakeholders are taken into account, their different claims, agenda priorities and the different interests they represent, spanning from governments, research communities through local communities, civil society to the private sector. These different interests are often not congruent and are symbolic expressions of the tensions and contradictions inherent in the issues that have arisen in all the different processes that touch upon PGR. Balancing or harmonising these diverse and oftentimes conflicting interests while achieving the objectives of the CBD, and the ITPGR, is by no means simple and smooth. Issues arising out of the World Trade Organisation (WTO) running parallel to CBD and FAO discussions have also added to the complexity of the situation and significantly increased the challenges faced by African countries in addressing the relevant issues. The TRIPs regime of the WTO is particularly controversial in this regard and has perhaps become the basis of the most heated debate and dispute which has characterised the North-South divide.

Prior to these recent developments, the predominating development paradigm in most African countries, especially since independence, had been rapid economic and industrial growth although the actual realisation of those objectives has been somewhat unaccomplished. However, this rather narrow-focused economic development agenda that, until recently, prioritised intensive resource exploitation in order to achieve economic growth has been instilled into government institutions and officials for decades (Chichilnisky, G. 1998). The mere inclusion of the term "sustainable" in official vocabulary in recent years has not been sufficient to replace that self-defeating paradigm (Biodiversity Action Network, 1999). That paradigm, to a significant degree, contributed to the rapid depletion of Africa's natural resources especially genetic resources.

The rapidly evolving globalisation process and economic structures have generally caught African governments unprepared and the consequent challenges they pose are, at best, befuddling to them.[12] All in all, National and regional responses in Africa to these emerging issues relating to PGR have been characterised by several observable trends and features:

- Prevailing responses have been largely reactive in nature rather than proactive. This had given rise to a situation where issues are not thought through before positions or decisions are taken. The accession to the WTO agreements is a goos example of this trend where decisions are taken even before the implications are considered at all and African governments have, as a result, found themselves continuously responding to other parties' agenda rather than setting their own. In some instances African countries have hastily incorporated provisions of international agreements even before the time set for such implementation denying themselves the opportunity to negotiate better terms.
- There are deficiencies in providing resources and coordination, as well as in the adequacy of the genetic resources conservation systems and in the knowledge and information upon which decisions are based.
- Long term strategic planning is virtually non-existent while emerging issues are dealt with on ad hoc bases leading to a fragmented and often conflicting policy environment.
- There is a general lack of co-ordination between countries in the region and even between different departments within the countries, further compounding the situation.

In summary, although several countries have on paper, plans and strategies and there are certain programs and activities currently in place, geared towards contributing to the conservation and sustainable use of genetic resources, they are by themselves not sufficient. Conservation efforts are generally under-resourced, in places uncoordinated, and sometimes inappropriate. There is particularly no integration of PGR issues into the larger economic/development policies and plans of the respective governments despite their strategic importance especially in food and health security, poverty alleviation and sustainable development. Emerging initiatives cannot, therefore, afford to neglect them.

B. Regional agreements and programmes

The first and, to date, the only region-wide agreement with respect to genetic resources was the African Convention on the Conservation of Nature and Natural Resources which was approved by the Council of the Organisation of African Unity at its 11th Ordinary Session in Algiers in September 1968, and subsequently signed by the Heads of State and Government. Although as at the time of negotiation and adoption the convention was rather forward-looking, most of the conceptual issues as they are known and understood today were not within the contemplation of the negotiators. Unquestionably, international environmental law and conceptions have evolved and advanced significantly since its adoption. Indeed the period between the 1972 Stockholm Conference to the 1992 Conference on Environment and Development to the World Summit on Sustainable development scheduled for the second half of 2002 proliferation of international agreements on environmental law. These agreements have contributed to the crystallization of new international environmental law principles that were not incorporated in the African Convention.

Innovative as it may have been, the Algiers Convention is now basically moribund as neither was the institutional framework for enforcement and implementation set up, nor any tangible apparatus put in place for follow up. Understandably, in the light of the profound dilemma facing the newly independent States of Africa as at then, the task of reconciling the demands of economic development, social justice and environmental protection was a challenge facing them and clearly, environmental/conservation issues did not enjoy that high a level of priority. However, the need to adapt the text of the convention to current scientific, technical and legal thinking and approaches has necessitated the ongoing process for its review both to bring it up to date and to address the particular needs and current challenges of the region.[13]

Despite the challenges and shortcomings which the region faces, a growing number of governments, organisations and institutions within the region, including the OAU itself, are addressing the subject of genetic resources and are seeking the best approaches to solve the emergent, and largely complicated, issues surrounding it. It was in recognition of the possibilities that lie within and the threats that face and arise from biodiversity exploitation that the Scientific Technical and Research Commission of the OAU, in 1998, set up a task force to come up with a draft model legislation as a guide for member states in enacting the requisite national laws for the protection of the continent's rich biological resources and the equitable sharing of the benefits with the local communities. There is also in process another model legislation to provide adequate safeguards against the possible risks involved in biotechnological R&D and the handling of genetically modified organisms. However, the issues are complex both in the way they are being dealt with and in their very substance as governments grapple with the challenges of translating the models into national laws and the capacity for their implementation.

Several regional and sub-regional institutions currently exist whose activities touch upon PGR and which can also contribute immensely to their conservation and sustainable utilisation. One of these is the African Ministerial Conference on the Environment (AMCEN), which was established in 1985 to strengthen cooperation between African governments on economic, technical and scientific activities to halt the degradation of Africa's environment and satisfy the food and energy needs of the continent's people. AMCEN's role includes providing continent-wide leadership by promoting awareness and consensus on global and regional environmental issues, especially those relating to international conventions on biodiversity, desertification and climate change. These issues currently form the core of the Environment Initiative under NEPAD and it is envisaged that AMCEN will play the leading role in its implementation.

Other sub-regional organisations and groupings like SADC, ECOWAS, EAC, CORAF and ASARECA also have several ongoing activities and programmes in process and can as well give additional impetus and contribute significantly to the PGR conservation and sustainable use as envisaged by NEPAD.[14] The NEPAD, is to be a pledge by African leaders, based on a common vision and a firm and shared conviction, that they have a pressing duty to eradicate poverty and to place their countries, both individually and collectively, on a path of sustainable growth and development, and at the same time to participate actively in the world economy and body politic. The initiative recognises, among others, that the urgent need to achieve food security in African countries requires that the inadequate agricultural systems be addressed, so that food production can be increased and nutritional standards raised.[15] It further recognizes that the institutional environment for agriculture also significantly affects the sector's productivity and performance. The regulatory framework for agriculture must also be taken into account, including the encouragement of local community leadership in rural areas, and the involvement of these communities in policy and the provision of services. While the document contains a detailed shopping list of objectives and expectations, in the process of setting up the institutional framework and relevant capacity for the realisation of these objectives is still a work in progress.

C. Plant Genetic Resources conservation

Conservation measures.

Plant genetic resources are the raw materials used in the production of new cultivars either through traditional plant breeding or biotechnology. Whether used directly by farmers as raw materials or by plant breeders, these resources are a reservoir of genetic adaptability that acts as a buffer against potentially harmful environmental and economic change. The erosion of genetic resources, however, poses a severe threat to Africa's food security and sustainable development in the long term. Although often under-valued, the urgent need to conserve and utilize plant genetic resources as a safeguard against an unpredictable future is clear.

One of the principal objectives of the CBD and the ITPGR and further enunciated in the NEPAD is the conservation of genetic resources both for present and for future generations. However, beyond the general statements of acknowledgment of need so to do, usually minimal efforts and resources are allocated for effective conservation activities. The conservation of PGR can be achieved through two broad approaches – ex situ and

in situ – which involve the conservation of PGR or their components within or outside their natural habitats respectively. However, the most prevalent approach in Africa is in situ conservation which involves the establishment of protected areas such as national parks or strict nature reserves. An emerging and increasingly popular form of in situ approaches is on farm conservation, where farmers maintain cultivated varieties in traditional farming systems and cultural norms. Both ex situ and in situ conservation methods have their own strengths and weakness and therefore have to be used complementarily.[16] For instance whereas in situ conservation allows for continued evolution on of the species, the shortcomings include increasing encroachment on protected areas, climate variability, changing land use practices and problems arising from lack of resources and capacity for maintenance and monitoring. In the light of these and other problems, much more precise ex situ approaches are currently being utilized to collect and conserve PGRs, the most prevalent being the use of gene banks. However, ex situ conservation provides safety of genetic resources but it freezes the evolutionary process making re-introduction and adaptation of germplasm to changing climatic conditions difficult later. Hence the justification for complementary conservation approaches.

Regional Gene-Banking

The need for regional gene banking is imperative, definitely because of shared resources and inter-dependence, but also for the additional reason that throughout history, crops have travelled beyond national borders, exchanged by farmers and rural communities, and carried around the world by ecological interactions, shifting populations and explorers. As a result, most countries rely on crops that originated elsewhere for a large part of their production and consumption. In many countries, crops originating in other parts of the world have become a national dietary staple and a major export.[17] Regional gene banks need not be established afresh, some of the existing and more viable national gene banks may be re-designated and up-graded to serve the regional needs. Alternatively, through appropriate agreements and arrangements, the gene banks belonging to some of the international institutions/organisations operating within the regions, say the CGIAR centres like IPGRI and IITA, may provide their facilities for this purpose.

Several countries in the region have established gene banks but most lack the necessary resources and infrastructure to maintain their collections or the capacity to effectively carry out their functions while a number of the genebanks are actually deteriorating. Several institutions and organisations operating in the region also maintain gene banks, some active and well-maintained while some others are small and also suffer similar fate as some of the national gene banks. The most active and sustained gene banks are those maintained by the CGIAR centres. The GGIAR, established in 1971, consists of 16 international agricultural research centres. One of CGIAR's principal research objectives is to contribute to the preservation of biodiversity by establishing ex situ collections of plant genetic resources. This collection currently comprises over 600,000 accessions of more than 3,000 crop, forage and pasture species. The agricultural research centres of CGIAR in Africa which maintain genebanks include: International Center for Research in Agroforestry (ICRAF), International Livestock Research Institute (ILRI), International Institute of Tropical Agriculture (IITA), International Plant Genetic Resources Institute (IPGRI) and the West Africa Rice Development Association (WARDA). Several other CGIAR Centers such as the International Rice Research Institute (IRRI), ICRISAT, and ICARDA have programmes in Africa and have conserved germplasm originating from the continent in their gene banks which are located in other regions of the world. Because of the large number of accessions they maintain, their technical capabilities and other resources, the CGIAR centres are key players in the region and must be taken into account one way or another in the regional programmes and policies relating to the conservation, management and utilisation of PGR.

As stated, most countries in Africa are unable to sustain national gene banks as a result of lack of resources and capacity. This provides a rationale for considering the establishment or reinforcement of regional gene banks which could be based on economic/ecological zones.[18] Another compelling reason why a regional approach is necessary is the fact that groups of countries in the region lie within the same ecological zones and share virtually the same PGR and if they were to establish separate and uncoordinated genebanks, they would most likely contain largely identical collections. In principle, this is not by itself bad, but in the light of limited resources a more collective approach would assist in maximising synergies to avoid unnecessary costs, avoid undue duplication, and exploit comparative advantage. It would also promote co-ordination which will assist national approaches by providing integrated policy guidance, coherent programming of work, co-ordinated scientific

inputs, and rationalisation of financial and technical support (Nnadozie, 2001; Biodiversity Action Network, 1999). Regional gene banks could also serve as the highly essential germplasm duplication centres for national gene banks which are usually susceptible to all sorts of environmental and institutional variables that make them vulnerable and therefore unstable. However, sustainability mechanisms for long-term maintenance of such regional gene banks would need to be worked out articulately.

National Gene Banks.

Since the advent of the CBD and the formal recognition of national sovereignty over genetic resources there is a more acute awareness of the need for control at the national level of resources within a country. A certain level of control is considered essential for strategic and national security reasons and this can be achieved through maintaining national gene banks amongst other measures. However, not all the countries have the necessary resources or capacity to do so. Currently, several international organisations, notably IPGRI, already provide considerable support to National gene banks within the regions. Despite this, more technical and material support is needed to sustain them. As is the case in most other areas, there is a lack of coherent policies with respect to ex situ conservation of PGR and a well-articulated policy framework and appropriate legislative instruments will greatly enhance conservation and sustainable use of PGR in the individual countries and the region as a whole.

Despite the case for the regional gene banking approach, keeping and maintaining national gene banks are still necessary based on National priorities and policies especially for the conservation of genetic resources of particular national importance. They are necessary for building up national capacity and competence in PGR-related activities and also essential for academic, national breeding programmes and encouraging domestic research and development designed to respond to national and local level conditions and needs

• National gene banks are likely to respond more quickly to national needs while also serving as primary sources of germplasm for regional gene banks

• Through a co-ordinated approach, national gene banks could focus on those PGRs that are of particular and strategic importance to the countries while the regional gene banks can collect a wider range of varieties including wild and under-utilized species for long term conservation.

D. Participation in international forums

The policy environment in most African countries is, at the moment, largely incoherent and uncoordinated with most of the relevant issues being discussed or negotiated in parallel in different international fora. In addition to the extensive paucity of capacity, a further complicating factor is that each of these negotiations is usually handled by different ministries and departments (e.g. WTO -Trade; Intellectual property - Patent Office; CBD - Environment; FAO - Agriculture), which in most cases lead to a loss of policy coherence and weaken the countries' position. Discussions are, therefore, essential between all the relevant ministries and between countries in order to agree on mutually acceptable negotiating positions for related processes, so that countries are able to understand the linkages between, and implications of, all the international negotiations. Good communication with Geneva-based negotiators is also essential to ensure clear communication of positions taken by the competent authorities in capitals. In addition, countries may wish to make effective links among regional blocs to improve their negotiating strength and collective bargaining ability in advance of the relevant sessions of the various agreements, for instance the review of TRIPs Article 27.3(b).

In addition a there is a notable lack of consistency in the composition and constitution of the delegates sent by various ministries, which makes follow up and familiarity with issues difficult. On a balance, participation by African countries in the relevant international fora has been very nominal often leading to a situation where they have agreements or decisions foisted upon them due to lack of effective participation. Lack of full understanding of the longer-term implications or cross-functional effects of the respective agreements is also a problem. The WTO agreements are a case in point. This situation has also made it difficult to integrate African

level concerns/issues into the global processes. This is exemplified in the lack of reference and comprehensive provisions governing for instance community and farmers' rights in both the CBD and the ITPGR.

Low-level participation is largely due to lack of capacity both at the individual and institutional levels – not enough qualified people and lack of resources for effective participation due to multiplicity of parallel processes. However, reasonable progress has been made in certain areas, reinforced by the collective regional approach adopted. This is the case with respect to the negotiations on BiosafetyProtocol and during the Doha meeting of the WTO, although more still needs to be done.

E. International support and collaboration

Since independence, most African countries have depended heavily on aid and external support in practically all sectors and this trend is likely to continue in the foreseeable future at least in most of the countries. This dependence is made more critical as a result of the external debt over-hang, limited resources and lack of capacity. While the NEPAD espouses African solution to African problems, there is the realisation that the objectives cannot be fully realised with only internal and local efforts and resources. The NEPAD, therefore, recognises that while the problems facing Africa can only addressed through internally generated initiatives, they cannot be solved or managed without external help and co-operation. [19]

As a result of the global nature of most issues, particularly genetic resources issues, countries and institutions outside Africa are, or have also become, active stakeholders and need to be factored into the relevant processes. In the area of PGR for instance, a vast array of ex-situ collections fall outside the CBD's purview and the sovereign right of countries of origin (the CBD does not apply to such collections in existence prior to its coming into force). This formed the basis for the provision of a multilateral system under the ITPGR, although the issue surrounding it is still unravelling. It must be acknowledged that several international institutions have operational presence or linkages at the national and, in some cases, local level where many of problems need to be addressed and are, therefore, well equipped or positioned to make a significant impact. It is invariable, therefore, that significant progress can only be made through effective and well-oriented international support and co-operation. However, the mechanisms for engaging external stakeholders have evolved continually over the years and it is critical that the region continuously reviews its modalities of engagement in order to set the rules to be able to maximise the opportunities they present and minimise the inherent risks.

Also assuming critical roles on the relevant issues are NGOs, CBOs and other specialised associations, generally referred to as "the civil society". Given that environmental NGOs are among the most vocal critics of policy and active participants at the local level, it also implies there is a potential constituency with which regional bodies and initiatives can ally themselves and benefit from the strength of Civil Society Organisations' (CSO) advocacy to enhance effective genetic resources policy and action. The civil society has been recognised as a critical component of the global environmental governance and sustainable development and can play a critically important role in addressing the relevant issues. There is, however, a significant gap in the NEPAD with respect to the involvement of the civil society in its implementation. Consultative processes need to be initiated to fully involve all sectors of the society, including the private sector, in a continuous dialogue with a view to effective implementation, monitoring and review of the programmes of action of the NEPAD.

In paragraph 191 of NEPAD, it is planned to "Strengthen and refocus the capacity of Africa's agricultural research and extension systems. The project addresses the issue of upgrading the physical and institutional infrastructure that supports Africa's agriculture. Technological innovation and technology diffusion hold enormous potential for accelerating agricultural output and productivity, but the continent lacks the research capacity necessary for major breakthroughs. Major players include the Forum for Agricultural Research in Africa (FARA), the World Bank, the FAO and the Consultative Group on International Agricultural Research (CGIAR)". There is the recognition that significant progress can be made by the effective participation of international support. While bilateral support has played a significant role and could still contribute immensely, additional development can be precipitated by international and multilateral institutions already working in the region especially in the area of capacity building.

It is in this respect that IPGRI can, with its partner ACTS, facilitate and catalyse a process of capacity building to enhance the policy aspects of agricultural research, as they relate to PGR, as one of the footholds for the acceleration of agricultural output as envisaged by NEPAD. IPGRI as one of the CGIAR centres is particularly well positioned to play this role because of its existing intellectual capital and other resources as well as its extensive experience in promoting the conservation and sustainable use of PGR for enhancing agricultural productivity in Africa. These institutions can also help in mobilising additional resources for other regional PGR related activities.

IV. THE ROLE OF PGR IN A NEW AFRICA

In practical terms, the principal areas that plant genetic resources (PGR) can obviously play a significant role are in Health, Agriculture, Environment and, by necessary extension, with respect to poverty alleviation. There are, however, several other not-so-obvious but important sectors for which PGR are also critical.

A. Agriculture and food security

The NEPAD states that: " The urgent need to achieve food security in African countries requires that the problem of inadequate agricultural systems be addressed, so that food production can be increased and nutritional standards raised".[20] It is an established fact that PGR constitutes the basis of agricultural production hence, food security. In the absence of a comprehensive policy which takes into consideration the conservation and sustainable use of PGR, any initiatives taken with respect to boosting food security is only short-term and deficient. Therefore, genetic resources issues must be fully incorporated in any ongoing or proposed social and economic policy programmes.

Currently, the actual and potential role that genetic resources can play is not being fully brought to bear on agriculture and food production issues in Africa. As a result of this, it is likely that the problems of poor productivity, which successive schemes have sought to address, will persist unless there is a significant policy shift that fully incorporates and implements concrete genetic resources components. For instance, one of the key elements of the agricultural production is the quality of the reproductive material used during cultivation. Particular attention need to be paid to the quality of materials or germplasm used so as to ensure higher yield and greater nutritional value and this can be done by making the best varieties based on local materials available to farmers.

B. Health and nutrition

Plants and herbs have been used by man to cure diseases and heal injuries since time immemorial and in recent years, renewed interest has been growing in the use of medicinal plants as well as natural products. Scientific studies are beginning to explain the efficacy and some of the curative phenomena associated with traditional herbal remedies (Oliver-Bever, 1986). There has also been growing awareness by governments, the scientific and medical communities of the importance of medicinal plants in health care systems in Africa.[21] The resurgence of interest in ethno-medicine, ethno-botany and ethno-pharmacology has resulted in the intensification of field studies stimulated not only by the intellectual curiosity but also from the realization that the Plant Kingdom represents a vast emporium of untapped medical potentialities. Recent discoveries of unbelievably potent and effective properties in plants – the so called "Wonder Drugs" of the past 40 to 50 years have convinced humanity that we are undoubtedly neglecting life-saving or health promoting constituents lurking in the many kinds of plant tissues in our ambient vegetation.

It is primarily in tropical regions of the earth, within which a large section of Africa lies, where ethno-botanical investigations are yielding the richest harvest with potential for high economic returns (Ayensu, 1978). WWF (1993) estimates that the turnover of pharmaceutical trade in Western Europe in 1989 was US$65 million compared to US$ 2.2 billion for plant based medicines and about 25% of all pharmaceutical drugs dispensed in the USA contain one or more substances of plant origin. An enormous number of these medicinal plants are found in Africa. For example, the flora of Ghana reveals that there are 754 medicinal plant species used by the local people, while the flora of Zaire has 51 genera with 160 medicinal plant species. It is now possible to extract many new therapeutic substances from 260 plant species found in Haut-Zaire (Irvine, 1961; INEAC, 1963; Printz and Heke, 1986).

In addition, there are numerous under-utilised and neglected species with great potential for addressing problems of food security, nutrition and health that have not been given sufficient attention by the research and development sectors. For example there are many indigenous fruits and leafy vegetables that have higher nutritional content than the most common introduced horticultural crops. Such species include the baobab (Adansonia digitata, Amaranthus spp., Cleome gynandra and Solanum nigrum, among others (Chweya and Eyzaguirre, 1999?, Maundu…1999?). There is a direct link between a balanced nutrition and a healthy and productive population.[22]

C. Environment

More evident, however, are the obvious roles that PGR play in respect to the environment and this is explicitly recognised by the NEPAD policy document which states in paragraph 176 that "Africa's biodiversity – including its rich flora and fauna and the rainforests – is an important global resource in combating the environmental degradation posed by the depletion of the ozone layer and climate change, as well as the pollution of air and water by industrial emissions and toxic effluents". It goes on to state further in paragraph 12: "Africa has a very important role to play with regard to the critical issue of protecting the environment. African resources include rainforests, the virtually carbon dioxide free atmosphere above the continent and the minimal presence of toxic effluents in the rivers and soils that interact with the Atlantic and Indian Oceans and the Mediterranean and Red Seas. The New Partnership for Africa's Development will contain a strategy for nurturing these resources and using them for the development of the African continent while, at the same time preserving them for all humanity." (emphasis supplied). The need, therefore, to articulate appropriate PGR policies and integrate them into the broader national plans and strategies cannot be over-emphasised.

D. Poverty alleviation.

The introduction to the NEPAD states that "We are convinced that an historic opportunity presents itself to end the scourge of underdevelopment that afflicts Africa. The resources, including capital, technology and human skills, that are required to launch a global war on poverty and underdevelopment exist in abundance and are within our reach. What is required to mobilise these resources and to use them properly, is bold and imaginative leadership that is genuinely committed to a sustained human development effort and the eradication of poverty, as well as a new global partnership based on shared responsibility and mutual interest."[23]

It further states that the "improvement in agricultural performance is a prerequisite of economic development on the continent. The resulting increase in rural peoples' purchasing power will also lead to higher effective demand for African industrial goods. The induced dynamics would constitute a significant source of economic growth."[24]

In this milieu, PGR is and can be used as a veritable tool to address the problems associated with production levels, food security and poverty alleviation as well as health through better nutrition. Linked to this also are other benefits and not-so-obvious governance gains. It will reinforce the economic renewal process as farmers earn more income and facilitate better income re-distribution.

In addition, a wide range of wild species including roots and tubers, leafy vegetables and fruits provide ready sources of income for resource poor households and many provide a significant proportion of total household income, particularly where farming is marginal. For instance, in the United Republic of Tanzania in 1988, it was calculated that the value of all the wild plant resources to rural communities whether for subsistence consumption or sale was more than US$120 million, about 8% of the GDP (Kiss, 1990). The countries of West and Central Africa sub-regions have identified a large number of under-utilized species that are important to the livelihoods of local populations. These include cereals (7 species), legumes (8), roots and tubers (4), oil crops (8), fruits and nuts (31), vegetables and spices (17), beverages (4), medicinal plants (38) and 44 genera of forages (FAO, 1998). A good number of these species have a great potential for wider cultivation, and with sufficient research and development investments, could become major crops and even economic spinners.

Crucial also and inherent in the poverty alleviation question are gender issues. The NEPAD undertakes to give special attention to the reduction of poverty among women;[25] to establish a gender task team to ensure that the specific issues faced by poor women are addressed in the poverty reduction strategies;[26] and to improve the productivity of agriculture, with particular attention to small-scale and women farmers.[27] It has been established that women contribute significantly, in some cases more, to both household food and commercial crop production especially in rural communities.[28] They are also highly knowledgeable about local production systems as well as the plant varieties and their special characteristics. However, poor rural women who live under the same harsh conditions as their male counterparts suffer from cultural and policy biases which undervalue their contribution to development and prevent them and their families from benefiting from the productivity of their labour. Since rural women play a key role in farm and non-farm activities, these biases can lead to serious misallocation of household resources and deterioration of the natural resource base. The key element in the long term is the creation of an overall economic and social environment which facilitates full participation of women, support of their genetic resource conservation activities and their access to viable and good quality materials.

E. Governance and peace

In a region that has suffered a long history of civil war and conflict, promoting region-wide oriented PGR programmes could be an instrument that can contribute to peace by stimulating fresh, while consolidating ongoing, political co-operation between the governments of the region and promote social stability by ensuring that different sectors of the society benefit from access to, and can enjoy direct use of natural resources. As countries in the region continue to collaborate more on these issues, more participatory and democratic processes will be encouraged, as transparency is demanded. This will, invariably, filter into other sectors. There also appears to be a definite indication that a strong agricultural sector helps to create a stable society through the interplay in the income-nutrition-poverty reduction nexus.

Food has in many cases become a political weapon, while lack of it has been the bases of many conflicts or the escalation of existing ones. Shortfall in food security invariably results in various inter-linked adverse conditions in a country's political and socio-economic system. Furthermore, in current international diplomacy and relationships, not only are biodiversity, food and national security intimately linked, but the safeguarding of biological resources and community rights can no longer be ignored in the development or conduct of the regions foreign policies. A strong and productive agricultural sector will certainly help in addressing the very serious refugee problems that many countries in Africa currently face.

F. Scientific and technical research

There is currently no accurate or reliable appraisal of Africa's PGR, yet scientific knowledge and data should form the basis for decision making and inform the choices made in respect of allocation of resources and setting of priorities. Scarce resources and ever-decreasing allocation to public-oriented research have exacerbated the situation. NEPAD proposes "to promote cross-border cooperation and connectivity by utilising the knowledge currently available in existing centres of excellence on the continent".[29] This can only be effectively done if

these centres of excellence are identified, their research activities ascertained, co-ordinated and directed towards addressing the existing and emergent problems in the relevant sectors. In this regard NEPAD's programmatic desire is to facilitate and "to develop networks among existing centres of excellence, especially through the Internet, for cross-border staff exchanges and training programmes, and develop schemes to assist displaced African scientists and researchers". Invariably, scientific and technical research is key to achieving the objectives of the NEPAD and the Institutions of higher learning such as Universities as well as other Research Institutions could contribute immensely in that regard. Without doubt Africa is not anywhere near achieving sufficiency but from all indications, there is a significant array of scientific and technical expertise both within the continent and in diaspora. What seem, however, to be lacking most are the institutional capacity, material resources, and the appropriate policy framework to co-ordinate and capture available expertise in order to direct it towards addressing Africa's huge socio-economic problems.

The Universities especially present a huge potential both as reservoirs and sources of existing capacity or for developing new and relevant expertise, for instance, through the development of relevant curricula for a wide array of specialised PGR training courses, graduate and/or post-graduate programmes. They could also serve as incubating grounds for innovation and pioneering practical solutions to both immanent and emerging problems particularly in the area of agricultural production, medicinal plants and PGR issues generally. However, this huge potential is currently not being exploited. This situation is attributable to a variety of reasons ranging from lack of resources and funding, to outright deliberate neglect, and even outright suppression, by relevant governments and authorities.

According to NEPAD, its "plan supports the immediate strengthening of the university system across Africa, including the creation of specialised universities where needed, building on available African teaching staff. The need to establish and strengthen institutes of technology is especially emphasized".[30] It also envisages promoting networks of specialised research and higher education institutions. In this regards, it recognizes, for instance, that the institutional environment for agriculture also significantly affects the sector's productivity and performance.[31] Institutional support in the form of research centres and institutes, and the provision of extension and support services will further boost the production of marketable surpluses.[32] It has been observed that one of the most critical issues for most African research institutions is how to build the requisite capacity for mobilizing global science and technology to contribute to agricultural research and primary health care and the overall economic development. Presently, this issue is addressed on an ad hoc basis through a variety of efforts including overseas training, on-the-job training and the largely discordant effort of individual scientists and non-governmental organizations.

NEPAD, therefore, acknowledges the need to strengthen and refocus the capacity of Africa's agricultural research and extension systems and the fact that technological innovation and technology diffusion hold enormous potential for accelerating agricultural output and productivity, even though the continent currently lacks the research capacity necessary for major breakthroughs. It further proposes to address the issue of upgrading the physical and institutional infrastructure that supports Africa's agriculture with the assistance of major players in this area, which include the Forum for Agricultural Research in Africa (FARA), the World Bank, the FAO and the Consultative Group on International Agricultural Research (CGIAR)[33]. PGR research and development is, therefore, a natural starting point to start reinforcing the research institutions and Universities to play a more proactive, productive and constructive role in the sustainable development of the region and for the benefit of global society in general.

V. MARKET ACCESS, BIOPROSPECTING AND REGIONAL TRADE IMPERATIVES

A. PGR and trade

As stated, the economies of countries in the region depend heavily on natural resources and are exporters of predominantly primary products based on agriculture. However, current global trade and economic environment highlights the need for adding value to agricultural products for profit maximization, creation of employment and sustainable development through agro-industries etc. Current global trade regimes are, without doubt, skewed against developing countries as they lack the capacity to compete effectively or take advantage of the opportunities they provide. With the advent of the World Trade Organisation, trade issues have rapidly become the predominating subject of international diplomacy and negotiations both at bilateral and multilateral levels. The WTO Agreements have expanded the scope of international trade rules into previously unaffected aspects of domestic production and marketing, including intellectual property rights, agriculture, phyto-sanitory measures etc. Their application and interpretation as well as the ongoing negotiations of the several aspects have been the subject of intense debate covering such issues as unfair trade regulations, quota systems, subsidies, restrictions, etc. Africa's future development and the sustainable utilisation of its immense natural resources will depend, to a large measure, on how these issues evolve and are managed.

Bioprospecting activities have been going on in the continent for decades both at formal and informal levels. These activities have gone on in an environment of open access where there was no obligation to share benefits until the Convention on Biological Diversity was negotiated and came into force. The prospects of obtaining some share in bio-prospecting profits were clearly one reason for developing country enthusiasm for the CBD. However, to date these profits have been elusive, and the win-win opportunities foreseen when uniting conservation and sustainable development objectives have been few and far between. In a study carried out recently on these issues it was concluded that technology transfer and capacity building is preferable over arrangements anticipating financial windfalls, which may never materialize. This does raise the issue of how to equitably distribute non-monetary benefits from access agreements to various parties, in particular local communities. Another element highlighted by the study is how contractual agreements can facilitate access and avoid potential problems around IPR (Columbia University, 1999).

The fact that there is currently minimal financial benefit sharing from bioprospecting as contemplated by the CBD does not mean that there aren't other commercial aspects of PGRs. As stated, there is currently a large volume of informal trade in genetic resources going on in various parts of Africa. This trade is not particularly structured though certain customs may be observed by those involved, but it is usually not captured in the respective national socio-economic calculations or indices despite the fact that this trade supports the livelihood of millions of people and provides their basic nutrition and healthcare needs. Global market for herbals, botanicals, and other natural products (including cosmetics, herbs and spices, industrial products – gums, resins, essential oils etc.) is also booming, while the market fundamentals suggest continuation of strong and growing consumer demand.

B. Local markets

The history of herbal medicine is as old as human history itself. In the continent of Africa, the application of herbs for both internal and external curative purposes in human and animal health has always been entrenched in local cultures and traditions. The treatment of a wide range of diseases with decoctions prepared from barks, leaves, stems and roots is even up to now normal practice in many African rural communities (Kokwaro, 1976). Because of the efficacy and astringent properties of certain plant parts, such applications have been highly successful for many generations. In South Africa, for example, 60 % of the population relies exclusively on traditional plant- based medicine for primary health care. It is noted by IUCN (1993) that the most important issues pertaining to quality of life in rural Africa is health care. It is estimated that the ratio of "modern" doctors

to villagers is 1:100,000 while the ratio of traditional herbalists to villagers is 1:200. According to the IUCN report, traditional herbalists are more accessible, less expensive and many rural people believe that traditional medicines are more reliable than modern medicine.

The market potential at the community level for traditional medicines is therefore considerably high being manifested by the presence of a wide range of medicines in many African local markets. For example, it is evident that the trade in herbal medicine has picked momentum in the last decade with the decline in the provision of western-type health services and the post-independence resurgence of traditional values and beliefs. Currently, the volume of trade on medicinal plants is growing in rural area and urban markets. (Obado and Odera, 1992) reported that many markets in the rural and urban areas and towns have popular sections selling medicinal plants. In Africa, the emergence of commercial medicinal plants distributors in response to urban demands for medicines and rural unemployment has resulted in open door to many miscellaneous players in a once specialist domain. Traditional medicine vendors have become a feature of many market centres, with towns and cities being concentrated centres of demand drawing traditional medicines from outlying rural areas and across national borders. These activities, prevalent as they may be, are not captured in the formal economic reckoning of most countries.

C. International markets

The potential world market of phytomedicines or herbal medicines is very large, but its significance to the global economy can only be inferred from a few sources of diverse and inadequate data. The World Health Organization (WHO) estimated in the late 80's for instance that the world trade in medicinal plants amounted to US $ 500 million a year (Lambert et al., 1997). However, information from diverse sources suggests that the overall trade in herbal medicines has since then greatly increased. This has been accelerated by a renewed interest in traditional medicines in many developing countries, especially Europe and North America (Grunwald, 1994). The developing countries particularly those in Asia are the main suppliers of plants used in pharmacies in developed countries. However, in Africa and Latin America, local and regional trade in medicinal plants is growing rapidly along with an increased demand by international plant traders hoping to discover new "wonder" drugs.

Demand for herbal medicines and products is growing around the world and several African countries are currently exporting medicinal plants to markets across the globe. The Europe and US herbal medicine markets are growing fast and in 1996, Europe imported in the region of 26,500 tons of medicinal and aromatic plant material from Africa, which was second only to Asia in exporting this volume to Europe in that year (Brevoort, 1996). Medicinal plants imported from Africa included Catharanthus roseus and Rauvolfia vomitoria from Madagascar, Cinchona bark from Democratic Republic of Congo, Prunus africana from Cameroon, Kenya and Madagascar, among others. Countries that are known exporters of medicinal plants outside Africa include Botswana, Cameron, Kenya, Madagascar, Mozambique, Namibia, South Africa, Tanzania and Uganda. The key species identified as important in overseas international trade are Dioscorea sp., Prunus africana, Harpagophytum sp. from Botswana and Namibia, Aloe ferox from South Africa and other Aloe sp. from Eritrea, Kenyan and Tanzania, Drosera madagascariensis and Rauvolfia confertiflora from Madagascar.

Pharmaceutical institutions in the technologically advanced nations and also those in developing countries have developed the necessary capacities for extracting active ingredients from numerous plant species in the formulation of modern drugs. Throughout the world, large quantities of plants are being used for anti-cancer activity and many African plants are being actively worked on as likely candidates for new drugs (Ayensu, 1978). Equally interesting is the screening of some species of yams (Dioscorea sp.) widely distributed in Africa, which are sources of a starting material (diosgenin), which is widely used for the preparation of birth control drugs. In West Africa, bromelain, an enzyme isolated from the stumps of pineapples after harvest is an anti-inflammatory pharmaceutical used in the treatment of sprains and contusions. There is currently a world shortage of bromelain and the increased exploitation of this otherwise waste product could become, to the improvement of the world's medical supply, a rewarding pharmaceutical and financial foreign exchange earner.

Perhaps one of the African species with the highest potential in the global market is Prunus africana, which occurs naturally in montane forests from Ethiopia in the north, down to South Africa, as far west as Nigeria and as far east as Madagascar (Cunningham and Mbenkum, 1993). The products from this tree are a known cure for prostrate cancer and there is no doubt that the market for herbal treatments for urological and prostatic problems is lucrative. In 1994, German men spent US$ 150 million for this purpose alone with a large proportion of this being P. africana. In the past 10 years, the annual harvest of P. africana bark has risen to 3,500 tons of which the majority comes from Cameroon (2,000 tons) and Madagascar (600 tons). The global trend in Prunus-based remedies is currently estimated at US $ 220 million annually (Cunningham et al., 1997).

Extracts from the Hoodia cactus, found in the San territories of southern Africa is potentially worth a fortune, because it could very well be the first plant to give rise to a commercially viable appetite suppressant drug without any side effects, especially in a world that is now plagued with obesity. For thousands of years the San have used the Hoodia cactus as an appetite suppressant and thirst quencher. It helped them endure long hunts, and resist the temptation to eat their kill before they returned to their camps. Pfizer, of the Viagra fame, the licensee of the extract, is also hoping to develop another blockbuster drug from it.

While access and use of traditional herbal medicine is high in Africa, the role of customary practices in health care has not been fully appreciated by the governments. However in the last few decades, biotechnological advances have stimulated interest in medicinal plants and related indigenous knowledge (Owiro and Juma, 1996). In the world of pharmaceutical industry, herbal medicine holds great economic potential for the rural majority in Africa, thus making bioprospecting for medicinal plants an economic incentive for the conservation and sustainable use of medicinal plants.

VI. ROUNDTABLE OUTCOME AND EMERGING ISSUES

The Roundtable was inspired by the need to identify and make use of new opportunities to enlarge political support and policy foundations for conservation and sustainable use of plant genetic resources by entrenching their role in the programmatic framework for Africa's renewal. It was particularly noted that Africa's participation in global biodiversity and related processes could be improved to ensure that the norms created address Africa's problems. Of particular concern in this regard is:

- representation of Africa's issues in the global agenda;
- more active engagement and involvement in WSSD;
- mobilization of political and financial support for NEPAD;
- strengthening the role of science and technology through Chapter 35 of Agenda 21 and Article 5 of the ITPGR.

In this light, certain programmatic issues were identified as critical from the discussions during the roundtable and they include:

A. Strengthening conservation and use of PGR through national and regional programmes

Effectiveness in the conservation and use of plant genetic resources can be greatly enhanced by the development of strong and well coordinated national and regional programmes that bring together stakeholders to discuss priorities and action plans. In order to strengthen these programmes, it is necessary to carry out a survey to assess current capacity within countries, and across the region and set priorities for plant genetic resources capacity-building programmes. This may in part be accomplished by means of identifying Centres of Excellence at national, regional and sub-regional level that could serve as focal points for well-targeted research and development initiatives. In addition the following activities may be undertaken to complement this effort:

- the incorporation of plant genetic resources issues into the educational curricula of institutions of higher learning, especially universities;
- the strengthening of existing regional programmes and networks on plant genetic resources, and the development of linkages to enhance collaboration between them;
- strengthening coordination mechanisms of both national and regional plant genetic resources programmes;
- strengthening linkages between conservation (gene banks) and use (crop improvement programmes and other users) with a view to making better use of plant genetic resources collections;
- setting up a network of expertise in taxonomy across the region, to address the short
- supply of these highly valuable technicians.

B. Bioprospecting and benefit sharing

Africa is well endowed with a wealth of a wide diversity of plants whose economic potential in pharmaceutical, industrial and other commercial sectors is largely under-utilized. The use of these plants could be optimized through:

- an assessment of the current status of plant genetic resources bioprospecting and benefit sharing, and the human, research and management capacity available
- adding value to plant genetic resources, by building capacity to identify economically valuable plant genetic resources traits, with a view towards commercialization. This may require the development of specialized research laboratories, the re-training of scientists, and a re-orientation of national and sub-regional research and development activities
- a study to determine national, sub-regional and regional needs in bioprospecting, taking into account community, sovereign and individual/corporate rights. This includes capacities for value addition and processing for enhancing the market potential
- a study to determine ways of optimizing benefits from bioprospecting while conserving and sustainably using plant genetic resources through the development of enabling policy, legal and institutional framework at national and regional levels
- the identification of a regional coordinator and establishment of regional mechanisms/standards for bioprospecting to spearhead activities and provide technical services.

C. Capacity building

At the moment, the capacity of the African nations to effectively conserve and use their plant genetic resources, obtain the maximum benefits from the plant genetic resources endowment and participate effectively in international negotiations is hampered by:

- inadequate expertise in the science of plant genetic resources
- insufficient conservation infrastructures and facilities
- insufficient negotiation skills and disjointed efforts for collective bargaining abilities in international negotiations
- insufficient institutionalization of plant genetic resources concerns in the educational curricula in institutions of higher learning
- inadequate expertise in domestication of international treaties and development of
- national policies and legal frameworks.

There is a need to establish a mechanism for monitoring the dynamic policy environment at regional and international levels and adjusting to these constant changes. Continuous policy research will assist the region's governments develop and begin to act on a framework for integrated solutions and approaches at national, state and local levels, shifting focus from reactive measures to effective pre-emptive and proactive policies. It is, therefore, urgent for Africa to strengthen her technical capacity for in situ and ex situ conservation and utilization of plant genetic resources at the sub-regional and national levels, with a special focus on:

- human resource development, particularly in the following areas: inventory, collecting, plant genetic resources conservation management, characterization, regeneration, data management and distribution to users
- strengthening of conservation infrastructures
- establishment of national gene banks, at least for active collections.
- value addition to plant genetic resources through national and sub-regional research and development activities
- the establishment of sub-regional gene-banks as technical references, for safety duplication and long-term storage of the sub-regions' base collections
- carrying out a regional survey to assess known plant genetic resources, which would form the basis for databases and information networks, including an inventory of plant genetic resources in Africa
- enhancing Africa's understanding of the ITPGR, perhaps through the development of simplified versions of the Treaty and improving negotiation skills in international treaties.

D. Innovative financial mechanisms

The conservation and sustainable utilization of plant genetic resources is currently constrained by lack of sufficient funds to implement both programmatic and policy-related activities. The current investments from both domestic and donor sources of funds are minimal, given the magnitude of the task. Innovative mechanisms are therefore required, tapping from domestic, bilateral and multilateral sources, and trust funds. A sustainable funding initiative should be established through an African plant genetic resources Fund to support conservation and use of plant genetic resources. The funding mechanism should be sustained through contributions from national governments, the private sector and foundations.

E. Information management and public awareness

The current institutional frameworks for sharing and exchanging information at regional and sub-regional levels are weak and the use of diverse approaches makes harmonization difficult. The awareness of international plant genetic resources agreements and instruments is weak. This awareness needs to be created particularly at the policy levels to enable countries to participate more effectively and make more informed decisions in international fora and to expand knowledge and understanding of the relevant issues by the public in general in a systematic fashion. This underscores the need to launch a programme for the effective management of plant genetic resources information in the region and also establish an African PGR information resource centre. The programme should develop a system that will allow dispersed information, held and maintained by individual countries, international agencies and other institutions to be brought together and used to support decision making on conservation and development of plant genetic resources.

Efforts to enhance information exchange and public awareness should focus on:

- creation of awareness of the ITPGR and other international agreements.
- creation of public awareness at all levels for better understanding and response to plant genetic resources issues.
- the development of a regional database and roaster of experts in all components of conservation and use of plant genetic resources .
- the development of comprehensive information networks, regional databases and information and documentation systems to consolidate and store data and information generated in the conservation and use of plant genetic resources;
- accessibility and mechanisms for delivering this information and also for gathering further information;
- the development of catalogues of gene bank germplasm holdings and make them available to potential users.

VII. RECOMMENDATIONS

In order to address the emerging issues as outlined, the following programmatic thematic areas are proposed for incorporation into the NEPAD.

Programmatic Focus 1:
Conduct a regional plant genetic resources assessment and foresight

Most of Africa's wealth of plant genetic resources is unknown, unstudied, undervalued and under-utilized. Possibly less than 50% of the region's ecosystems and plants therein have been identified and studied. Threats to plant genetic resources are poorly assessed and analyzed. Yet ensuring the conservation and sustainable use of plant genetic resources will require adequate knowledge of and information on plants (in addition to crops and medicinal plants already studied) and their genetic foundations. Meeting NEPAD's goals of increased agricultural production, improving human health conditions by utilizing medicinal plants and promoting trade in plant genetic resources will be based on strong scientific knowledge and information on the region's plant genetic resources. In addition, when African countries ratify the International Treaty on Plant Genetic Resources, they will incur obligations to conduct inventories and assessment of plant genetic resources. Article 5 of the Treaty requires that "each Contracting Party shall, subject to national legislation, and in cooperation with other Contracting Parties where appropriate, promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources."

This is a proposal to establish an African process to explore, identify, assess/study and build knowledge of the region's PGR. The process would generate a scientific assessment of plant genetic resources, including information on the genetic content of some of the region's plants. Its specific goals may include to:

- build an information base for better conservation and sustainable use of plant genetic resources;
- enlarge the range of plants used in Africa's agricultural and health systems;
- add value to the plant genetic resources — knowledge of them makes its possible for Africa to participate better in negotiating for benefits from scientific and commercial utilization of the resources;
- inform the region's scientific and technological research in such areas as pharmaceuticals, biotechnology and genomics;
- improve the quality of policies and laws on plant genetic resources;
- strengthen regional and national capacity in scientific exploration, survey and assessment of plant genetic resources;
- inform the region's efforts to implement provisions of the Treaty.

Programmatic Focus 2:
Capacity building to improve Africa's participation in international negotiations and to domesticate the International Treaty on Plant Genetic Resources

Implementing the International Treaty on Plant Genetic Resources and related provisions of the Convention on Biological Diversity and WTO agreements will require expertise as well as information, financial and institutional resources that many African countries do not have or have in very limited supply. Many countries of the region are also preoccupied with pressing domestic economic and socio-political problems. They are often not able to mobilize their domestic resources to fully engage in international treaty negotiations.

This is a proposal to establish a regional programme to build Africa's capacity to participate in future negotiations on plant genetic resources and to implement related international and regional agreements. The programme would aim at:

- improving Africa's understanding of the Treaty, including the development of an African guide to the Treaty
- creating and enhancing skills for negotiating international agreements on issues of plant genetic resources, biodiversity and international trade
- mobilizing Africa's expertise to participate in future negotiations
- improving the capacity of African governments to formulate plant genetic resources policies and laws, including promoting the harmonization of plant genetic resources policies with those for development and trade
- improving national and regional capacities to analyze international treaties and their implications at regional, national and local levels and develop common negotiation positions for African states
- raising public awareness of the International Treaty on plant genetic resources and related agreements on biodiversity and trade
- promoting coherence between and among various ministries/sectors participating in negotiations
- mobilizing for and directing skills to the implementation of such regional instruments as the OAU model legislation on biodiversity and community
- promoting the implementation of laws at the national level that follow international legal obligations
- implementing national laws and developing regional initiatives that give expression to national priorities that do not find their source in international agreements (e.g. Farmers' Rights).

Programmatic Focus 3: Strengthening national and sub-regional plant genetic resources programmes

National and sub-regional plant genetic resources activities in most countries of Africa are faced with a variety of challenges including limited financial resources, lack of institutional capacity, poor articulation of and support to conservation and sustainable use goals, limited political interest in and support to plant genetic resources activities, limited technological infrastructure, and poor institutional linkages with development sectors. Meeting the goals of NEPAD (particularly those pertaining to improving food security and human health status) and implementing the Treaty on plant genetic resources will require strong national and sub-regional programmes. The Treaty recognizes the importance of building national and sub-regional plant genetic resources programmes. Article 14 of the Treaty (Global Plan of Action) requires "Contracting Parties should promote its effective implementation, including through national actions and, as appropriate, international cooperation to provide a coherent framework, inter alia, for capacity-building, technology transfer and exchange of information, taking into account the provisions of Article 13."

This is a proposal to create a NEPAD programme to strengthen national and sub-regional plant genetic resources programmes. Its specific goals would be to:

- improve financing of national and sub-regional plant genetic resources programmes
- build national and regional scientific and technical capacity for conservation and sustainable use of plant genetic resources
- establish and/or strengthen programmes for scientific and technical education and training in conservation and sustainable use of plant genetic resources
- develop and strengthen facilities for conservation and sustainable use of plant genetic resources
- promote networking between and among sub-regional plant genetic resources programmes.

Programmatic Focus 4:
Creating sustainable financing for plant genetic resources activities

A major constraint faced by most African countries in their efforts to engage in plant genetic resources conservation and sustainable use, as well as to meet other obligations created by regional and international agreements is that of limited financial resources. Under conditions of low or poor economic performance, declining government budgets and related structural adjustment reforms, and declining Overseas Development Assistance (ODA) generally and specifically to conservation, African countries need to search for alternative sources and instruments for ensuring sustainable financing of plant genetic resources activities. In addition, implementing new plant genetic resources initiatives within the framework of NEPAD will require financial resources from national, regional and international mechanisms.

This is a proposal to explore and establish a regional mechanism for sustainable financing of NEPAD and other regional, sub-regional and national plant genetic resources activities. The proposed programmatic focus would involve:

- studying and assessing current financial status, mechanisms and instruments for plant genetic resources programmes
- assessing future financial needs for meeting plant genetic resources conservation, sustainable use and benefit- sharing goals
- identifying and promoting measures for improving African governments' financial contributions to plant genetic resources activities
- conducting a feasibility study to establish an African plant genetic resources Trust or Endowment Fund
- establishing long-term strategies and mechanisms for raising funds from domestic and international sources, including from private sector. This will include exploring how well debt relief to national governments can support plant genetic resources activities.

VIII. CONCLUSION

There is, without doubt, a pressing need to strengthen current activities and improve policies, practices and attitudes to achieve conservation and sustainable use of genetic resources within the region. In this respect, there is an urgent need for the AU and NEPAD Secretariats and their organs to liase with relevant organisations with the aim of carrying out joint programmes on PGR and enriching any ongoing processes and initiatives. They should in the implementation of their programmes make possible for smooth cooperation with and coordination of all levels of government, industry, international institutions and other stakeholders. The need, therefore, for a comprehensive approach to bridging the gap between current efforts and the effective identification and management of the Africa's genetic resources effectively integrating both long- and short-term economic, environmental, social and equity considerations cannot be over-emphasised. This will entail continuous consultations with all major stakeholder groups to continuously develop new ways to address emerging issues as well as assess ongoing programmes. [34] Identified initiatives could be managed or co-ordinated in collaboration with other institutions in the continent. It would involve scientific research, capacity strengthening and mobilisation, policy research and formulation, and fostering a more formal regional biotrade process that will seek to strengthen the already ongoing, largely informal, commercial activities in genetic resources and fully capture the inherent potential benefits. To this end, the foregoing recommendations are relevant within the context of the NEPAD in order to fully actualise its vision and goals.

The NEPAD has been criticised on a number of grounds largely related to the shortcomings arising from inadequate consultations and co-ordination among parties, groups, and agencies before being put forward for adoption. There appear to be efforts currently underway to address this issue through wide consultations and outreach. It does, however, recognise that concerted collective action is required to make progress and calls on African peoples to take up the challenge of mobilizing in support of the implementation of this initiative by set-

ting up, at all levels, structures for organisation, mobilisation and action.[35] But beyond mere exhortation, there is a fundamental need to put in place mechanisms that will facilitate the active involvement of all levels of the society, not just in the implementation only, but also in the formulation of the activities that will constitute the projects and programmes under NEPAD.

In the light of the global trends and because of the importance of using the high-level intergovernmental processes that exist at the regional level, the emerging African Union can assume the role of promoting dialogue, sharing of experience and mutual support among its members given especially the peculiar characteristics of its membership and the challenges they face. If, for instance, the position of member states are harmonised and agreed positions are pursued in concert at the relevant international negotiations, the likelihood of obtaining the best possible terms that take into consideration the development needs of the continent will be greatly enhanced.

The benefits of adopting a regional approach in addressing some of these issues are numerous. For instance, co-ordination will assist national approaches by providing integrated policy guidance, coherent programming of work, co-ordinated scientific inputs, and rationalisation of financial and technical support. It could also facilitate the maximisation of synergies to avoid unnecessary costs, avoid duplication, and exploit comparative advantage (Nnadozie, 2001; Biodiversity Action Network, 1999). The joint effort of relevant institutions and sectors through proper co-ordination in the conservation and sustainable utilization of PGR would certainly enhance Africa's pursuit of sustainable development and self-sufficiency in food production.

Finally, any proposal aimed at improving food and health security and promoting sustainable development must incorporate aspects of genetic resources conservation and utilisation because it will contribute not only to protecting the ecological richness and biological heritage of the region, but it could also act as a catalyst to:

- Improve quality of life;
- Alleviate poverty;
- Build a better economic future and technology diffusion;
- Foster regional co-operation;
- Preserve the region's rich cultural heritage; and
- Promote a new image of Africa internationally.

The challenge before the implementers of NEPAD now, therefore, is how the relevant programmes can set about establishing a strategy and putting in place the processes that will help actualise its goals. The challenge is also how to go about implementation so that the mistakes of the past are avoided. Certainly, collaboration with or the leadership of existing but competent institutions or organisations and the participation of all relevant sectors of the society within the region in the relevant processes will go a long way ensuring success.

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Endnotes

[1] Paragraph 130.

[2] NEPAD paragraph 128.

[3] Paragraph 131.

[4] Paragraph 142.

[5] Paragraph 9 – 10. "Africa's place in the global community is defined by the fact that the continent is an indispensable resource base that has served all humanity for so many centuries… The rich complex of, the flora and fauna, and the wide unspoiled natural habitat, which provide the basis for mining, agriculture, tourism and industrial development."

Paragraph 12: "African resources include rainforests, ... The *New Partnership for Africa's Development* will contain a strategy for nurturing these resources and using them for the development of the African continent while, at the same time preserving them for all humanity.

[6] This imperative was also clearly recognised during the recently concluded Organization of African Unity Summit on HIV/AIDS, Tuberculosis and other Related Infectious Diseases, Abuja, 26 April 2001.

[7] AHG/OAU/AEC/Dec. 1 (V).

[8] See paragraph 2, Introduction, NEPAD.

[9] Paragraph 176

[10] Correa, Carlos, 2000. *Policy Options for IPR Legislation on Plant Varieties and Impact of Patenting*. GFAR/00/17-04-02, Global Forum for Agricultural Research(GFAR) May 21–23 2000 Dresden, Germany.

[11] Fairly recently, francophone countries in Africa negotiated the Bangui Agreement, a new law to be administered by the African Intellectual Property Organization (OAPI) which requires members to adopt UPOV-type model for the protection of plant varieties as dictated by Article 27.3(b). This agreement, signed by OAPI's 15 member states in February 1999, introduces -- for the first time ever -- a regime of intellectual property rights on seeds and is largely contrary to the OAU model legislation adopted at the OAU Summit in June, 1998 in Ouagadougou. The Bangui Agreement was revised recently and restricts the rights of farmers to save seeds from their harvests and imposes a system of royalty payments on commercial planting material.

[12] This issue has been one of the grounds for the criticism of NEPAD. See, for instance, *The Mail & Guardian, March 11, 2002,* where it was reported that the Southern African Catholic Bishops Conference (SACBC) has slammed the NEPAD. According to them, "NEPAD correctly states that current 'globalisation' policies fail to lift Africa out of socio-economic decline but then goes on to say that Africa therefore needs more of the same policies".

[13] There is currently a joint committee of the Organisation of African Unity, UNEP and IUCN undertaking the review of the Convention and is likely to submit its proposals to the African Union soon.

[14] Paragraph 155. "Foster regional, sub-regional, national and household food security through the development and management of increased production, transport, storage and marketing of food crops, livestock and fisheries".

[15] See part B3, paragraphs 129 – 134.

[16] A recent survey by IPGRI in collaboration with ACTS revealed major weaknesses even in *ex situ* conservation policies and legal frameworks in sub-Saharan Africa and recommended integrating genetic resources policy in all relevant sectors, while at same time providing guidelines for access to PGR by others and the sharing of benefits (IPGRI, 2001).

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