



# NATIONAL PLAN FOR CONSERVATION AND SUSTAINABLE USE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE



agriculture, land reform  
& rural development

Department:  
Agriculture, Land Reform and Rural Development  
REPUBLIC OF SOUTH AFRICA





**NATIONAL PLAN FOR CONSERVATION  
AND SUSTAINABLE USE OF PLANT GENETIC  
RESOURCES FOR FOOD AND AGRICULTURE**

Plant Genetic Resources (NPGRC)

Directorate: Genetic Resources

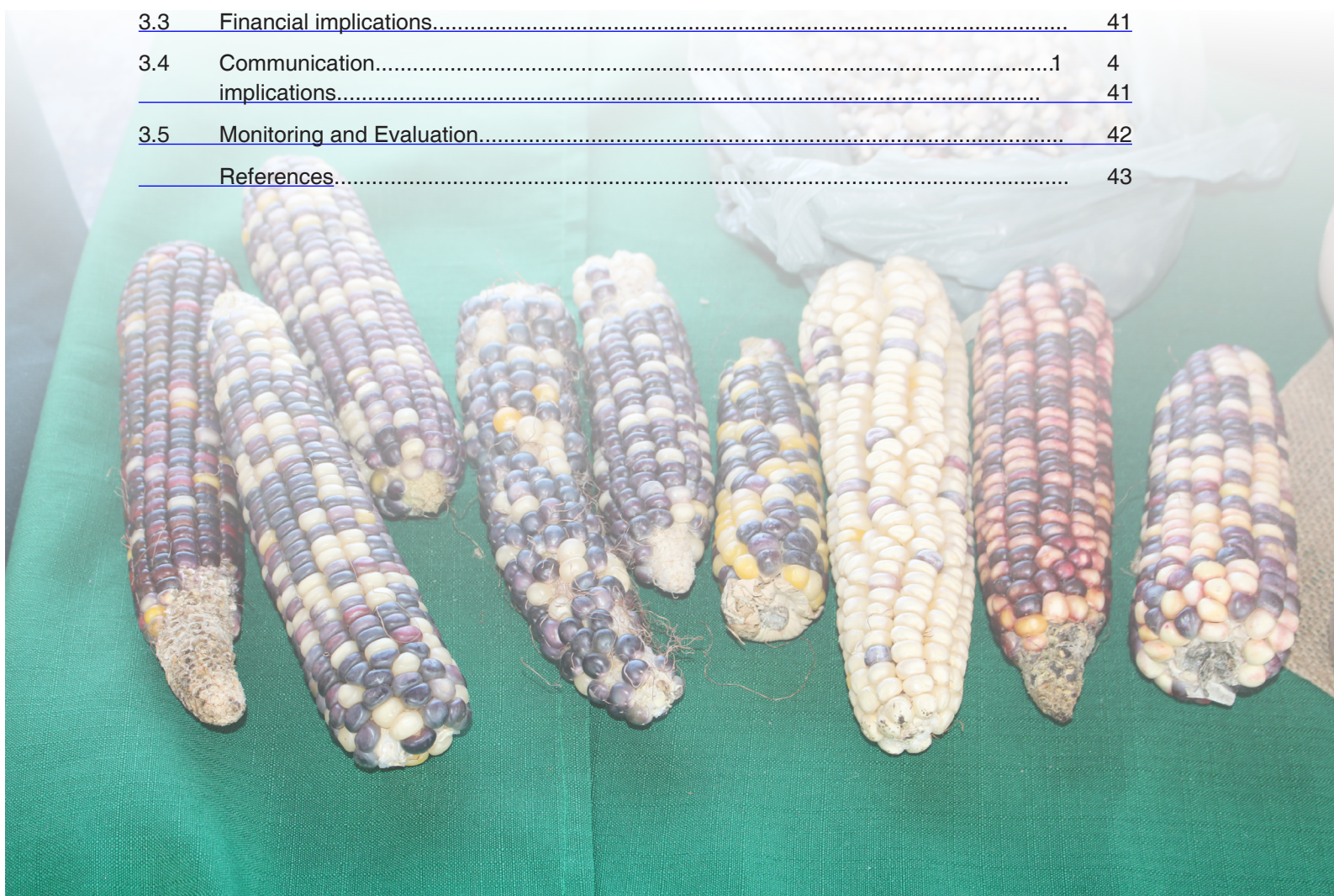
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## List of Acronyms

<b>ARC</b>	Agricultural Research Council
<b>ASRDC</b>	Agriculture and Sustainable Rural Development Committee
<b>CBD</b>	Convention on Biological Diversity
<b>CSB</b>	Community Seed Bank
<b>CWR</b>	Crop Wild Relatives
<b>DAFF</b>	Department of Agriculture, Forestry and Fisheries
<b>EXCO</b>	Executive Committee
<b>FAO</b>	Food and Agriculture Organization
<b>GDP</b>	gross domestic product
<b>GIS</b>	Geographic Information System
<b>GPA</b>	Global Plan of Action
<b>GSPC</b>	Global Strategy for Plant Conservation
<b>IPGRI</b>	International Plant Genetic Resources Institute
<b>ITPGRFA</b>	International Treaty on Plant Genetic Resources for Food and Agriculture
<b>NEMBA</b>	National Environmental Management Biodiversity Act, 2004
<b>NGOs</b>	Non-Governmental Organisations
<b>NPGRCom</b>	National Plant Genetic Resources Committee
<b>NISM</b>	National Information System Monitoring
<b>NPGRC</b>	National Plant Genetic Resources Centre
<b>NSAP</b>	National Strategic Action Plan for the conservation and sustainable use of Crop Wild Relatives in South Africa
<b>PDA</b> s	Provincial Departments of Agriculture
<b>PGR</b>	Plant Genetic Resources
<b>PGRFA</b>	Plant Genetic Resources for Food and Agriculture
<b>SADC</b>	Southern African Development Community
<b>SANBI</b>	South African National Biodiversity Institute
<b>SDG</b>	Sustainable Development Goals
<b>SDIS</b>	SADC Documentation and Information System
<b>Second GPA</b>	Second Global Plan of Action
<b>SPGRC</b>	SADC Plant Genetic Resources Centre
<b>STC</b>	Science and Technology Committee

## Definitions

**Accession:** A distinct, uniquely identifiable sample of seeds (other propagules or whole plants) representing a cultivar, breeding line or a population, which is maintained in storage for conservation and use.

**Community Seed Bank:** A place of storage where whole range of seed (indigenous/landraces/modern seed varieties) are conserved and managed by community members.

**Conservation:** Controlled utilisation, protection and development of the gene pool of natural and cultivated organisms to ensure variety and variability for current and potential value to human welfare in a sustainable manner.

**Crop Wild Relative:** Is a wild plant species that is more or less closely related to a particular crop and to which it may contribute genetic material but unlike the crop species, it has not been domesticated.

**Ex situ conservation:** The conservation of biological diversity outside its natural habitat. In the case of plant genetic resources, this may be in seed gene banks, in vitro gene banks or as live collections in field gene banks.

**Gene bank (Ex situ conservation facility):** Is a repository where biological material is collected, stored, catalogued and made available for redistribution and for other uses.

**Genetic diversity:** Refers to the number of different alleles (the alternate forms of genes) of all genes and the frequency with which they appear.

**Genetic Resources:** It can be defined as all materials that are available for improvement of a cultivated plant species.

**In situ conservation:** According to the CBD, this means “the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.”

**Landraces:** Crop plant populations that have not been bred as varieties but have been adapted through years of natural and artificial selection to the conditions under which they are cultivated and are usually genetically heterogeneous.

**On-farm conservation:** The management of genetic diversity of locally developed crop varieties (landraces/traditional) by farmers within their own agricultural or horticultural systems.

**Participatory plant breeding:** When farmers are involved in a plant breeding programme with opportunities to make decisions at different stages during the process.

**Plant breeding:** The process by which humans change the characteristics of plants over time to make them better crops for more nourishing food and high yields and other uses such as fibre, clothing, shelter, wood, timber, energy, etc. or for industrial use/application.

**Plant Genetic Resources for Food and Agriculture:** Means any genetic material of plant origin of actual or potential value for food and agriculture.

**Plant Genetic Resources:** Means any genetic material of plant origin of actual or potential value.

**Sustainable use:** The use of genetic resources in support of sustainable agriculture, which requires a system of agriculture that produces and facilitates access to sufficient food for all people and contributes to livelihoods and socioeconomic development while protecting the environment.

## EXECUTIVE SUMMARY

Plant Genetic Resources for Food and Agriculture (PGRFA) consist of the diversity of genetic material contained in traditional varieties and modern cultivars grown by farmers as well as Crop Wild Relatives and other wild plant species that can be used for food, feed for domestic animals, fibre, clothing, shelter, wood, timber and energy. These plants, seeds, or cultures are maintained for the purposes of studying, managing, or using the genetic information they possess. As a term, “genetic resources” carries with it an implication that the material has or is seen as having economic or utilitarian value. For many hundreds of years, farmers and farm families in both developed and developing countries, including South Africa, have been overseeing evolution in crops, combining genes in new and different ways to form “landraces” and varieties suited to their needs.

Human civilization has benefited greatly from the domestication, conservation and use of plant species used for agriculture and food production. For thousands of years, farmers have used the genetic variation in wild and cultivated plants to develop their crops. Genetic diversity is the basic factor of evolution in species. It is the foundation of sustainability because it provides raw material for adaptation, evolution and survival of species and individuals, especially under changed environmental, disease and social conditions and it will allow them to respond to the challenges of the next century. The future food supply of all societies depends on the exploitation of genetic recombination and allelic diversity for crop improvement and many of the world’s farmers depend directly on the harvests of the genetic diversity they sow for food and fodder, as well as the next season’s seed.

The considerable genetic diversity of traditional varieties of crops is the most immediately useful and economically valuable part of global biodiversity. Subsistence farmers use landraces as a key component of their cropping systems. Such farmers account for about 60% of agricultural land use and provide approximately 15-20% of the world’s food. In addition, landraces are the basic raw materials used by plant breeders for developing modern varieties. Plant genetic resources are essential to sustainable agriculture and food security; therefore, the conservation and use of plant genetic resources are urgent necessities for the present development and future survival of mankind.

Many plant genetic resources which may be vital to future agricultural development and food security are threatened today. The South African Country Report August 1995 indicates that recent losses of diversity have been large and that the process of “erosion” continues. Of major concern is the irreversible loss of genes, the basic functional unit of inheritance and the primary source of the variation in the appearance, characteristics and behaviour among plants. The conservation and sustainable utilisation of plant genetic resources are important to improving agricultural productivity and sustainability by contributing to national development, food security and poverty alleviation.

### 1.1 BACKGROUND

In recognition of the need to develop an effective framework for the management of Plant Genetic Resources, an International Technical Conference on Genetic Resources for Food and Agriculture was held in Leipzig, Germany in 1996. The conference adopted the Leipzig Declaration on PGRFA, which underlined the importance of PGRFA for food security and affirmed countries’ commitments to the implementation of the Global Plan of Action. The second report on the State of World’s Plant Genetic Resources published in October 2010 also emphasises the effective management of PGRFA as essential to global food security, sustainable development and the livelihoods of hundreds of millions of people.

The Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA) – which is a revision of the 1996 Global Plan of Action for the *Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture* was adopted by Food and Agriculture Organization (FAO) member countries in 2011. The Second GPA provides a framework that prescribes a set of 18 priority activities to guide action and progress at community, national, regional and international levels for the conservation and sustainable use of PGRFA. In essence, the Second GPA seeks to build upon the successes attained in FAO member countries over the years in the conservation of crop germplasm, their use in plant breeding and in the delivery of high quality seeds and planting materials that bear true fidelity to the PGRFA to the farmers who need them.

In response to the call for countries to implement the Second Global Plan of Action on PGRFA, the Department of Agriculture, Forestry and Fisheries (DAFF) is presenting a National Plan for the Conservation and Sustainable Use of PGRFA. This National Plan was developed on the basis of 18 strategic priorities expressed in the Second Global Plan of Action for PGRFA.

These strategic priorities are grouped into four main groups that directly address new developments, opportunities and challenges facing plant conservation and sustainable use in the face of climate change and food security, namely:

- *In situ* conservation and management
- *Ex situ* conservation
- Sustainable use
- Building sustainable institutional and human capacities.

## 1.2 The objectives of the National Plan are to:

1. Ensure the long-term conservation and sustainable use of PGRFA, including their wild relatives
2. Strengthen, promote and support *in situ/on-farm* and *ex situ* conservation activities related to the conservation and sustainable use of PGRFA
3. Promote access and exchange of PGRFA and the fair and equitable sharing of the benefits arising from their use
4. Facilitate the better management and use of PGRFA through improved access to and exchange of high quality and up-to-date information
5. Strengthen South Africa's institutions and capacity for implementation of conservation programmes on PGRFA
6. Promote and strengthen national, regional and international stakeholder collaboration for the implementation of the National Plan for the conservation and sustainable use PGRFA.

# CHAPTER 1

## FRAMEWORK FOR PLANT GENETIC RESOURCES IN SOUTH AFRICA

### 1.1 The Constitution

According to section 27(1) (b) of the Constitution of the Republic of South Africa, “everyone has the right to have access to sufficient food and water.”

Section 24(b) of the Constitution states that everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

prevent pollution and ecological degradation

promote conservation

secure ecologically sustainable development and use of natural resource while promoting justifiable economic and social development.

### 1.2 National Legislative Framework

There is currently no national legislation specifically addressing the conservation and sustainable use of PGRFA. There are, however, other national pieces of legislation, policies and programmes relevant to this subject and these are summarised below.

#### 1.2.1 National legislation

##### *1.2.1.1 The National Environmental Management Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004)*

The National Environmental Management Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004) provides for the management and conservation of South Africa’s biodiversity within the framework of the National Environmental Act, 1998; the protection of species and ecosystem that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources and the establishment and functions of a South African National Biodiversity Institute.

**The NEMBA is administered by the Department of Environmental Affairs. The objectives of the Act are:**

- a) Within the framework of NEMA, to provide for:
  1. the management and conservation of biological diversity within the Republic and of the components of such biological diversity
  2. the use of indigenous biological resources in a sustainable manner
  3. the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources
- b) to give effect to ratified international agreements relating to biodiversity, which are binding on the Republic
- c) to provide for cooperative governance in biodiversity management and conservation
- d) to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

#### 1.2.2 National policies

### 1.2.2.1 White Paper on Conservation and Sustainable Use

South Africa is a signatory to the Convention on Biological Diversity (CBD). The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997) is guided by the main aims of the Convention, namely conservation of biodiversity, sustainable use of biological resources and equity. The key goals of the policy are conservation of the diversity of landscapes, ecosystems, habitats, communities, populations, species and genes; sustainable use of biological resources and minimisation of adverse impacts on biodiversity.

### 1.2.2.2 South Africa's Strategy for Plant Conservation

South Africa has developed a Strategy for Plant Conservation aiming to improve plant conservation by developing and updating national and regional targets relevant to the Global Strategy for Plant Conservation and, where appropriate, to incorporate them into relevant plans, programmes and initiatives, including national biodiversity strategies and action plans and to align the further implementation of the strategy with national and/or regional efforts to implement the strategic plan for Biodiversity 2011-2020. The strategy was prepared by the South African National Biodiversity Institute and the Botanical Society of Southern Africa in collaboration with a network of South African botanists and conservationists. The objectives of the plant conservation strategy aim at addressing the following:

1. Plant diversity is well understood, documented and recognised
2. Plant diversity is urgently and effectively conserved
3. Plant diversity is used in a sustainable and equitable manner
4. Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted
5. The capacities and public engagement necessary to implement the strategy have been developed.

**Target 9 of the South Africa's Strategy for Plant Conservation addresses the genetic diversity of crops including their wild relatives and indigenous edible plant species to be conserved while preserving and maintaining associated indigenous and local knowledge. The goals of Target 9 include:**

1. Genetic diversity of 250 indigenous, edible species and traditional crop landraces conserved in the South African gene bank and duplicated in either the SADC regional gene banks or in Millennium Seed Bank
2. Priority Crop Wild Relatives conserved both in situ and ex situ.

## 1.3 Regional Policy Framework

On 17 August 1992, the Heads of States of countries throughout Southern Africa signed the Declaration and Treaty of the Southern African Development Community, officially creating SADC. The Declaration and Treaty specify areas of cooperation for the organisation's Member States, including food security, land and agriculture. The Southern African Development Community (SADC) consists of 15 countries whereby South Africa joined in August 1994.

In recognition of the importance of conserving plant genetic resources in Southern Africa, the SADC Plant Genetic Resources Centre (SPGRC) was established in 1989 following the signing of the Memorandum of Understanding, establishing the centre by Ministers of Agriculture in 1987. The SPGRC is located in Zambia, Lusaka and coordinates all activities related to in situ and ex situ conservation in the region through a network of National Plant Genetic Resources Centre (NPGRC). The regional centre has gene banks facilities for long-term conservation of material, serving as safety duplicates that are repatriated back to Member States when national samples are lost. South Africa actively participates in all activities of the SPGRC.

In order for the Southern African region to be able to properly conserve its plant genetic resources, it must establish well-coordinated and effective national strategies that will clearly define priority activities and timeframes for the conservation and use of PGRFA in harmony with the national policies, priorities of the

International Treaties, conventions and initiatives including the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture.

## **1.4 Global Policy framework**

South Africa is a member of various international organisations and is a party to international agreements that contribute to strengthening the conservation and sustainable use of plant genetic resources.

### **1.4.1 Convention on Biological Diversity (CBD)**

The Convention on Biological Diversity (CBD), which was signed by 150 dignitary countries in 1992 and entered into force in 1993 as a global and legally binding framework on biodiversity conservation and use, is the most significant regulatory framework for the conservation and sustainable use of the genetic resources. The CBD has three main objectives, viz., the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. South Africa ratified the CBD in November 1995. The Department of Environmental Affairs is a National Focal Point on CBD and related instruments such as the Nagoya Protocol on Access and Benefit Sharing.

### **1.4.2 The Nagoya Protocol on Access and Benefit Sharing**

The Nagoya Protocol on Access and Benefit Sharing was adopted on 29 October 2012, in Nagoya, Japan and implemented in October 2014 after its first adoption in 2010. South Africa ratified the protocol on 10 January 2013. The agreement aims at sharing the benefits arising from the utilisation of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies. As per Article 9, the parties shall encourage users and providers to direct benefits arising from the utilisation of genetic resources towards the conservation of biological diversity and the sustainable use of its components.

### **1.4.3 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)**

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) aims at conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of benefits derived from their use. It was adopted by the FAO's member countries in 2001 and came into force in 2004. Although South Africa has not yet acceded to the ITPGRFA, it continues to participate in the activities of the FAO Commission on Genetic Resources for Food and Agriculture.

### **1.4.4 Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture**

The Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA) is an agreed set of 18 priority activities that directly address the new developments, opportunities and challenges facing plant conservation and use in the 21st century. It provides a framework of action with these priority activities guiding action and progress at community, national, regional and international levels. South Africa has also endorsed the FAO's Second GPA as adopted by FAO member countries in 2011.

### **1.4.5 Sustainable Development Goals (SDG)**

The Heads of States and Government and High Representatives, in a meeting held at the United Nations Headquarters in New York from 25-27 September 2015, decided on the new global Sustainable Development Goals. 17 Sustainable Development Goals with 169 associated targets were announced. Sustainable Development Goal 2: End hunger, achieved food security and improved nutrition and promote sustainable agriculture is of relevance to this National Plan, particularly Target number 2.5 which is aiming at maintaining the genetic diversity of seeds, cultivated plants, farmed and domesticated and their related wild species including sound management and diversified seed and plant bank at the national, regional and international

levels, and promote access to and fair and equitable sharing of benefits arising from the utilisation of genetic resources and associated traditional knowledge, as internationally agreed.

## 1.5 Overview of National Agriculture

The South African agricultural sector is dualistic in nature, with commercial agriculture existing in parallel with smallholder and subsistence farming.

The land surface of South Africa covers 122,3 million ha and has a total population of about 55,6 million people. Approximately 83% of agricultural land in South Africa is used for grazing; while 17% is cultivated for cash crops. Forestry comprises less than 2% of the land and approximately 12% is reserved for conservation purposes. About 13% of South Africa's surface area can be used for crop production with 22% of the total arable land regarded as high-potential arable land (Figure 1). In Table 1 below, eleven categories of land use in South Africa are listed and described. The most important factor that limits agricultural production is the non-availability of water. Rainfall is distributed unevenly across South Africa with humid, subtropical conditions occurring in the east and dry desert conditions in the west.

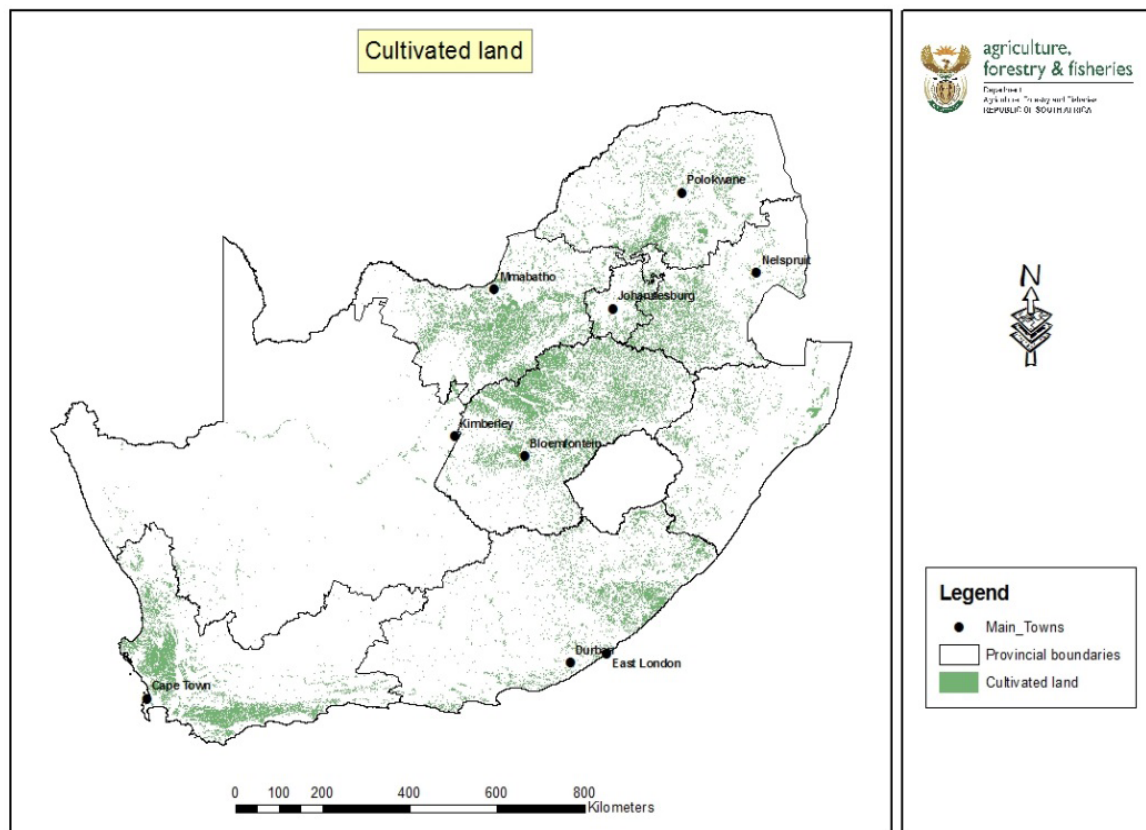


Figure 1: Map of cultivated areas in South Africa (DAFF: 2015)

Despite its relatively small share of the total gross domestic product (GDP), about 2,4%, the impact of agriculture, forestry and fishing has, over the period 2010 to 2015, achieved an average annual growth rate of about 5,58%. Moreover, primary agriculture is an important sector in the South African economy and agriculture remains a significant provider of employment (around 860 000 people), especially in the rural areas. The number of households engaging in agriculture is estimated at around 2,3 million in 2016.

As one of the most employment intensive sectors of the economy, when agricultural primary produce is produced intensively like is the case with hydroponics, aquaponics, vegetables, fruit industry and floriculture (averaging 10 jobs per hectare), agriculture's potential impact on empowerment and poverty relief is much larger than its actual weight in the economy. The agriculture, forestry and fisheries sectors are crucial to South Africa's socioeconomic development. However, the future of these sectors depends on critical issues such as climate change, population growth, skills shortages, changes in consumer needs, shifts in the global



economy and related markets. Agricultural activities range from intensive crop production and mixed farming to cattle-ranching in the bushveld and sheep farming in the more arid regions. Furthermore, agro-processing and agro-manufacturing activities which are outcomes of the primary agriculture, if incorporated as forming part of the total value chain, therefore agriculture will contribute greater than 12% to the national GDP.

Primary agriculture support both secondary (agro-processing and manufacturing) and tertiary agriculture (agro-logistics and marketing). More importantly, the primary agricultural sector serves as a source of raw material for agro-processing industry. Agro-processing industry entails the following divisions: food, beverages, paper and paper products, wood and wood products, textiles, wearing apparel, furniture, tobacco, rubber products, footwear and leather and leather products. The agro-processing industry is a subset of manufacturing, which contributes about 31,2% to the real output of the manufacturing sector and 7,8% to the GDP. The importance of the agro-processing sector, amongst others, is its backward and forward linkages, respectively, with the upstream and the downstream industries.

**Table 1: Classification of cultivated areas (ha) in South Africa (DAFF: 2015).**

Classification	Province Area in Ha									
	EC	WC	NC	FS	GP	NW	MP	LP	KZN	
Annual Crop Cultivation / Planted pastures	469 305.05	1 439 224.76	161 768.56	3 513 400.45	324 112.10	1 832 711.26	1 063 944.96	442 690.34	291 543.33	
Horticulture	0.00	77 862.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Viticulture	0.00	125 478.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Horticulture / Viticulture	39 253.58	0.00	8 602.84	3 176.17	1 574.26	4 926.16	42 265.82	69 609.80	16 414.09	
Total Old Fields	16 748.85	15 018.69	1 114.27	108 113.21	5 380.02	121 608.03	80 400.67	134 160.31	13 400.40	
Pivot Irrigation	25 786.13	68 507.96	92 274.92	159 259.22	21 522.45	83 796.84	45 497.23	149 498.27	63 689.21	
Shadenet	0.32	874.06	0.00	71.16	776.22	14.69	306.28	2 283.69	5.66	
Small holding	4 081.96	1 625.75	423.26	10 131.76	19 645.63	7 841.15	5 650.12	10 355.71	829.33	
Strip Field Cultivation	0.00	124 728.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total Subsistence	775 783.53	1 019.10	4 328.44	29 267.61	3 187.25	250 828.27	108 554.44	592 498.44	525 334.85	
Tea Plantations	2 049.09	35 334.29	0.00	0.00	0.00	0.00	0.00	1 071.09	0.00	
<b>Total Area (ha)</b>	<b>1 333 008.51</b>	<b>1 889 674.30</b>	<b>268 512.29</b>	<b>3 823 419.58</b>	<b>376 197.93</b>	<b>2 301 726.40</b>	<b>1 346 619.52</b>	<b>1 402 167.65</b>	<b>911 216.87</b>	<b>13 652 543.05</b>
<i>*Sugarcane not included</i>										

The forestry industry is one of the strategic economic sectors in South Africa, with a significant contribution towards economic growth and job creation. Therefore, the expansion of South Africa's forest resources remains one of the DAFF's main objectives to ensure growth, transformation and sustainability of the sector. With respect to land use, the afforested area is about 1,27 million ha or about 1% of the total South African land area of 122,3 million ha.

The grain industry is one of the largest in South Africa, producing between 25% and 33% of the country's total gross agricultural production. The largest area of farmland is planted with maize, followed by wheat and, to a lesser extent, sugar cane and sunflowers.

The South African coastline covers more than 3 000 km, linking the east and west coasts of Africa. These shores are particularly rich in biodiversity, with some 10 000 species of marine plants and animals recorded. The productive waters of the west coast support a variety of commercially exploited marine life, including hake, anchovy, sardine, horse mackerel, tuna, snoek, rock lobster and abalone. South Africa has two fisheries sector components, namely the wild capture and aquaculture. The wild capture fisheries includes three distinct

components, commercial, recreational and subsistence fisheries, each of which has specific research and management interventions. The aquaculture (fish farming) sector, which is considered underdeveloped, has been prioritised by government due to declining wild stock.

## CHAPTER 2

### THE NATIONAL PLAN FOR THE CONSERVATION AND SUSTAINABLE USE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

#### 2.1 The structure of the National Plan

Taking note of the guidance provided in the Second Global Plan of Action (Second GPA) for Plant Genetic Resources for Food and Agriculture, the National Plan structure comprises of 18 strategic priorities. The priorities have been identified and grouped into four main categories as follows:

- *In situ* conservation and management
- *Ex situ* conservation
- Sustainable use
- Building sustainable institutional and human capacities.

##### 2.1.1 *In situ* conservation and management

The conservation of plant genetic resources in natural ecosystems and their on-farm management provide for the continued evolution and adaptation of these resources to changing environmental forces and are therefore essential for the generation of new diversity important for future crop improvements. Farmers and indigenous and local communities play a crucial role in the development and conservation of plant genetic diversity *in situ*, especially on-farm. The management of crop diversity at farm level has since been considered as a recognised method of conservation, particularly for traditional crop varieties. Farmers have always been growing several crops as a strategy of spreading the risk of biotic or abiotic stresses. This strategy of crop diversity can also be utilised to help farmers cope with climate change to reduce hunger, dietary deficiencies and malnutrition. Farmer seed systems are the key to the production and to the conservation of plant genetic resources. The Second GPA describes key policies, capacities, research and technology needs as well as coordination strategies required for plant genetic resources.

###### 2.1.1.1. *Surveying and inventorying plant genetic resources for food and agriculture*

Rational conservation of PGRFA (*in situ* and *ex situ*) begins with surveys and inventories, as highlighted in Article 5 of the International Treaty. In order to elaborate policies and strategies for the conservation and sustainable use of PGRFA, national programmes need to know what resources exist in their countries, their distribution and the extent to which they are already being conserved. Countries that have ratified the Convention on Biological Diversity (CBD) have acknowledged specific responsibilities in this regard (for example in the Programme of Work on Agricultural Biodiversity). Wider accessibility to geo-referencing tools has facilitated surveying and the development and application of modern molecular biology techniques have assisted in assessing the extent of genetic diversity and, in some cases, of genetic erosion.

Knowledge of the existing crop diversity, its distribution and evolution over time is an essential prerequisite for developing effective and efficient PGRFA management strategies. This priority activity aims to facilitate the development, implementation and monitoring of complementary conservation strategies and national policies related to the conservation and sustainable use of PGRFA. It also aims to improve and apply methodologies for surveying and inventorying PGRFA *in situ* and *ex situ*, including Geographic Information Systems (GIS), remote sensing and molecular markers. It further aims to identify, locate, inventory and assess threats to PGRFA, particularly from land use and climate change.

There are currently no approved conservation strategies and national policies related to the conservation and sustainable use of PGRFA. The NPGRC had over the year's undertaken collections of landraces in eight provinces, namely Limpopo, Eastern and Northern Cape, Mpumalanga, Gauteng, Free State, KwaZulu-Natal and North West (no collections done in Western Cape). The NPGRC has also compiled an inventory of accessions stored at the NPGRC as well as in gene banks of other institutions such as ARC.

Landrace crops collected are maize, cowpea, sorghum, sweet sorghum, Bambara groundnuts, groundnuts, mung bean, melons, watermelons, beans, pumpkins, pearl millet and calabash. Information on farmers' name, village name, district, province, collection site data, method of propagation, indigenous knowledge (use, post-harvest handling, cropping system, beliefs and taboos related to the crop, division of labour at household level) was collected. A survey was done by interviewing farmers who still keep landraces and identifying potential farmers for on-farm/in situ conservation activities. The SADC Documentation and Information System (SDIS) of all crops that were collected and deposited for storage in the gene bank are available. Some of the conserved accessions have been deposited at the SADC regional centre for long-term conservation and safe keeping.

### *2.1.1.2. Supporting on-farm management and improvement of plant genetic resources for food and agriculture*

This priority activity aims to promote and improve the effectiveness of on-farm conservation, management and use of farmers' varieties/landraces, Crop Wild Relatives, underutilised crops, wild food plants and rangeland genetic resources and their integration with ex situ conservation efforts. It also aims at realising farmers' rights at national and regional levels and according to national legislation and priorities, including the equitable sharing of benefits arising from the use of PGRFA. The role played by gender and age on in situ on-farm management of PGRFA should be given attention. This priority should also look into how government should focus on considering how production, economic incentives and other policies as well as agricultural extension and research services might facilitate and encourage the on-farm management and improvement of PGRFA.

The Department of Agriculture Forestry And Fisheries recognises the contribution farmers made for the conservation and use of the diversity for indigenous and traditional crops for food and agriculture. Apart from forming a basis for crop improvement pool, these crops through stable production serve as household level food security against hunger, nutrition and contribute towards poverty alleviation. A great role is played by women in on-farm management of crop diversity in most parts of South Africa. Youth involvement is still seen as a challenge and need to be encouraged for succession planning in the agricultural sector.

Collaboration with Bioversity International, together with PDAs through extension services has been effective in establishing Community Seed Banks (CSB) in two provinces (Limpopo and Eastern Cape). CSB plays a great role in making sure it promotes seed exchange and innovative information sharing among farmers. Incentives were provided to farmers for undertaking activities on on-farm conservation and multiplication.

- On-farm activities including multiplication, conservation, restoration of lost crops, seed sharing and repatriation were conducted in the following provinces:
  1. Eastern Cape: Sterkspruit
  2. Limpopo: Sekhukhune, Thulamela and Mutale
  3. KwaZulu-Natal: Eshowe and Kwangwanase
- Mpumalanga: Thembisile Hani and Mbombela Municipalities and Nkomazi Local Municipality.

### *2.1.1.3. Assisting farmers in disaster situations to restore crop systems*

Natural disasters and civil strife often challenge the resilience of crop systems, especially that of small-scale and subsistence farmers. Seed security is the key component of resilience. Immediate seed assistance can help farmers affected by an acute disaster by introducing more systematic approach to re-establishing seed security and crop system. There is growing recognition of the threats posed by climate change to seed and food security and the potential role that PGRFA can play in helping agriculture remain productive and robust under changed conditions.

When crop varieties are lost from farmers' fields, they can often be re-introduced over time from nearby areas, with some support through local markets and farmer to farmer exchange. This priority activity aims to establish a seed security framework whereby governments can develop and implement strategies for disaster responses that fully support the re-emergence of local seed supply systems. This activity will support efforts to collect farmers' varieties, particularly from areas that are vulnerable to disasters and conserve them in national and international gene banks in case of need.

The NPGRC is serving as back-up storage for planting material (seed) for distribution upon request to replace lost seed in affected areas. The NPGRC has the capacity and expertise to conserve PGRFA; however, there are no strategies in place to respond to disaster. A Community Seed Bank (CSB) has been established in three provinces nationally to encourage farmers to have safety back up and exchange of material to their fellow local communities. Crop systems need to be revised and revitalise other existing CSBs which are not functioning throughout the country.

#### *2.1.1.4. Promoting in situ conservation and management of Crop Wild Relatives and wild food plants*

Crop Wild Relatives, mostly found in protected areas, are under threat of degradation and destruction as they are not identified. Natural ecosystems contain important PGRFA including rare endemic and threatened CWR and wild food plants. These species are becoming increasingly important as source of new traits for plant breeding. Ideally CWR and wild species are conserved in situ, where they can evolve under natural conditions. Unique and particularly diverse populations of these species must be protected in situ when under threat. This priority activity aims to promote the sustainable use and conservation of Crop Wild Relatives and wild food plants of importance to food and agriculture both within and outside protected areas. Further aims to improve knowledge of the use of wild plants as source of income and food particularly by women.

Work on CWR is relatively new in South Africa. To date conservation planners and protected area managers have not been targeting the conservation of CWR. Ninety-two protected areas in the country have populations of priority CWR, conserving CWR in situ is not sufficient in itself. It is important to back up any in situ interventions with complementary ex situ conservation in gene banks as seed, pollen and living plants.

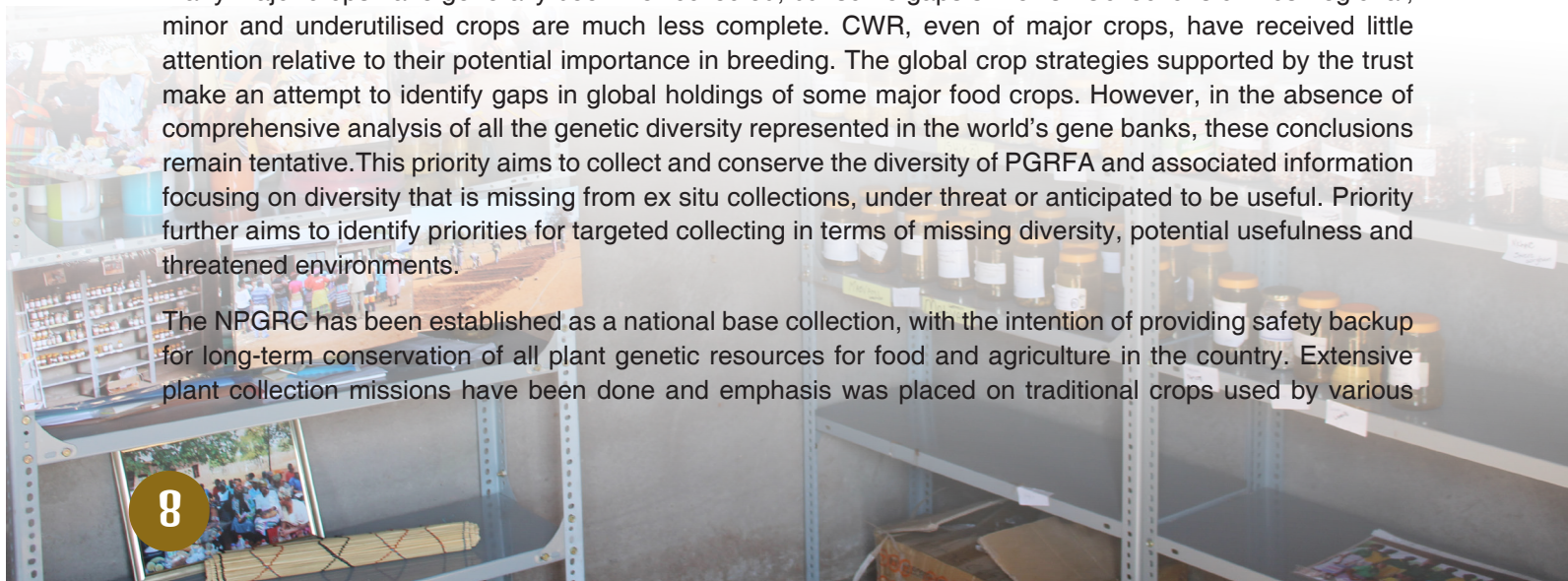
#### **2.1.2. Ex situ conservation**

Over decades, the need for conservation of plant genetic resources has become increasingly urgent as a result of the rapid depletion in the total naturally occurring genetic diversity on the planet. These losses in biodiversity ultimately pose a severe threat to food security in the long term. In an attempt to curb further biodiversity loss many countries and institutions have established gene banks for conservation of plant genetic resources. Ex situ conservation involves the collection and storage of crops/plants away from where they grow naturally. A range of ex situ conservation techniques are available, but seed storage in gene banks is the most practical ex situ conservation technique for many crop/plant species. Other means of maintaining samples ex situ are as living plants or explants in vitro and by cryopreservation.

##### *2.1.2.1. Supporting targeted collecting of plant genetic resources for food and agriculture*

The prime motivating forces for most collecting are gap filling, imminent risk of loss and opportunities for use. The germplasm currently conserved in gene banks does not represent the total variation in PGRFA. Many major crops have generally been well collected, but some gaps still exist. Collections of most regional, minor and underutilised crops are much less complete. CWR, even of major crops, have received little attention relative to their potential importance in breeding. The global crop strategies supported by the trust make an attempt to identify gaps in global holdings of some major food crops. However, in the absence of comprehensive analysis of all the genetic diversity represented in the world's gene banks, these conclusions remain tentative. This priority aims to collect and conserve the diversity of PGRFA and associated information focusing on diversity that is missing from ex situ collections, under threat or anticipated to be useful. Priority further aims to identify priorities for targeted collecting in terms of missing diversity, potential usefulness and threatened environments.

The NPGRC has been established as a national base collection, with the intention of providing safety backup for long-term conservation of all plant genetic resources for food and agriculture in the country. Extensive plant collection missions have been done and emphasis was placed on traditional crops used by various



communities within the country. However, their wild relatives have not been explored as such. The NPGRC is currently holding ± 6 300 accessions of different crops. The National Plant Genetic Resources Centre (NPGRC) is responsible for most ex situ conservation activities that includes cereals and legumes, forage and fodder, industrial crops, medicinal plants, ornamental crops and vegetables. The NPGRC also maintains accessions in the form of vegetative material. For safety backup, NPGRC duplicate material at the SADC Plant Genetic Resources Centre (SPGRC).

#### *2.1.2.2. Sustaining and expanding ex situ conservation of germplasm*

Seed, field and in vitro gene banks conserve approximately 7,4 million germplasm accessions, about a quarter of which are estimated to be distinct samples duplicated in several collections. These are complemented by over 2 500 botanical gardens worldwide that grow over one-third of all known plant species and maintain important herbaria and carpological collections. Driven by an increasing need for diversification, interest in collecting and maintaining collections of underutilised crops, wild food species, forages and CWR is growing. However, such species tend to be more difficult to conserve ex situ than major food or forage crops. Many important crop species do not produce seed that can be stored under conditions of low temperature and humidity and the conservation of such plants, with recalcitrant seeds or vegetatively propagated, is still not being given sufficient attention.

Governments and donor agencies need to invest more in the conservation infrastructure, in particular for species that cannot be conserved in seed banks, taking particular into account maintenance costs over the long term. This will stem the steady deterioration of many facilities and enhance their ability to perform basic conservation functions. Threat to ex situ collections is reflected in the high percentage of accessions identified as needing regeneration in the country. Therefore, the main objective of this priority is to develop a rational, efficient, goal oriented, economically efficient and sustainable system of ex situ conservation and use for both seed and vegetatively propagated species.

Crops in the gene bank are collected according to species lists developed by the SADC regional working groups under the auspices of the SPGRC. The NPGRC has the capacity for holding in tissue culture and glasshouses most of the vegetatively propagated crops. Currently, sweet potato accessions are duplicated in the glasshouses and tissue culture conditions. SANBI consists of 10 botanical gardens whose mandate is to conserve the nation's wide-ranging diversity at different ecological zones of South Africa as live collection.

#### *2.1.2.3. Regeneration and multiplication of ex situ accessions*

Regeneration is a key operation and an integral responsibility of gene bank that maintains viability of orthodox seeds. Multiplication is concerned with increasing germplasm accessions in the gene bank. As accessions stored ex situ decline in viability, both genes and genotypes are lost. Even under optimal ex situ storage conditions, all accessions eventually require regeneration. Regeneration capacity was often not considered when assembling collections and disseminating accessions, with the unintended consequence that much material collected in the past cannot now be properly maintained. Consequently, there is a large backlog of materials which requires regeneration. Low initial sample size, low viability and frequent demand for samples from long-term storage facilities can shorten the regeneration/multiplication cycle. This priority aims to regenerate and multiply ex situ accessions to satisfy needs for conservation, distribution and safety duplication.

The Buffelspoort Quarantine Station (North West Province) is the site used by the NPGRC for regeneration and multiplication of accessions. All first time accessions deposited with the NPGRC are multiplied. The current length of intervals between regeneration cycles (orthodox seeds) is every five years from the date of storage if viability has fallen to below 85%.

#### **2.1.3. Sustainable use**

Gene bank collections should help users respond to new challenges and opportunities to improve crop productivity, enhance sustainability and respond to climate change and pest resistance to meet human needs related to PGRFA. Germplasm collections of major crops house much of the diversity that will be needed to meet these challenges. There is therefore a compelling need for a better utilisation of plant genetic resources. PGRFA should not apply only to the conventional but also to the under utilised crop species. Improved

characterisation and evaluation can encourage greater and more efficient use of collections in that it aids the identification of germplasm with potential for further improvement by breeders and farmers as well as for direct use by farmers and production for marketing.

#### *2.1.3.1. Expanding characterisation, evaluation and further development of specific subsets of collections to facilitate use*

Characterising and evaluating plant genetic resources are essential for identifying materials with useful adaptive traits. Characterisation means the description of those characters which are sufficiently stable in their expression, irrespective of environmental influence. Characterisation should be based on standardised and calibrated measuring formats and characterisation data following internationally agreed descriptor lists developed by Bioversity International (previously International Genetic Resources Institute (IPGRI)). This priority is aiming at enhancing the use of and management of plant genetic resources in gene banks. The priority also aim to identify germplasm of potential value for research and crop improvement and for direct use by farmers in the rehabilitation of degraded ecosystems and other forms of direct use in agro-ecosystems.

South African rural communities still have high levels of hunger, malnutrition and poverty and many of the region's PGRFA are not being used adequately to meet these great needs. Aggravating the situation is the accelerated pace of climate change, which is ever more threatening to agriculture.

The NPGRC has conducted morphological characterisation in various crops, including: *Zea mays* (maize), *Vigna unguiculata* (cowpea), *Arachis hypogaeae* (groundnut), *Pennisetum glaucum* (pearl millet), *Ipomoea batatas* (sweet potato) and *Sorghum bicolor* (sorghum). Information on characterisation has been documented in the regional database SDIS.

#### *2.1.3.2. Supporting plant breeding, genetic enhancement and base-broadening efforts*

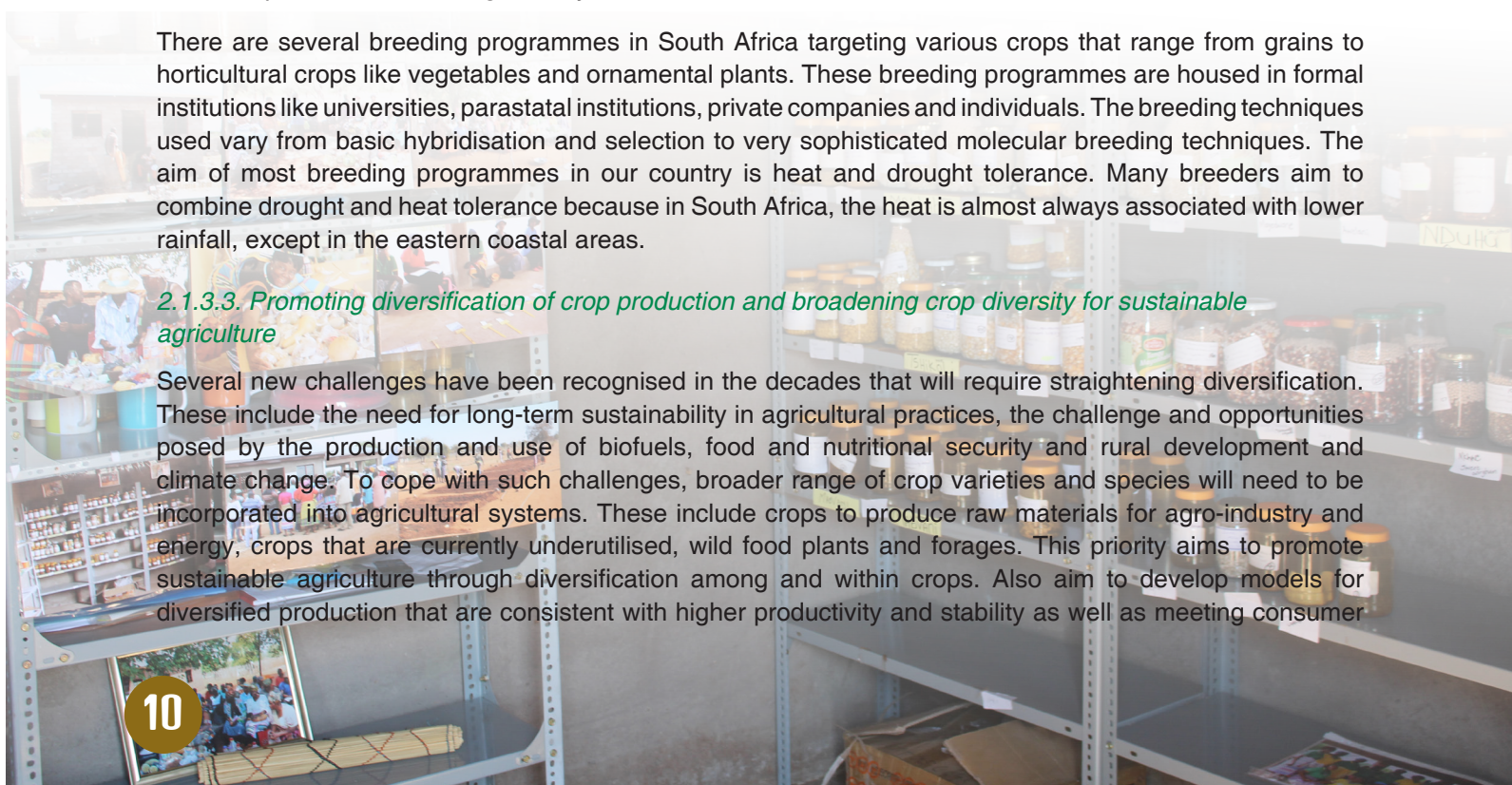
Germplasm collections can be used both to identify specific alleles that are useful for developing new varieties adapted to new conditions and needs and to broaden the overall genetic base of breeding programmes. While some materials can be used directly by breeders for either of these purposes, pre-breeding or genetic enhancement is often necessary to produce material that can be easily used by breeding programme. Newly bred varieties are means to deliver PGRFA to farmers.

An important contribution can be made through base broadening strategies that seek to widen the genetic diversity in plant breeding programmes and in the products of such programmes. This priority is aiming at contributing to food security and improved farmer livelihoods thorough the development of adapted crops and the development of resilient crop varieties that guarantee high yields under adverse environmental conditions and minimal input agricultural systems. This priority also aims to increase the use of genetic resources and therefore provides further tangible ways to conserve them.

There are several breeding programmes in South Africa targeting various crops that range from grains to horticultural crops like vegetables and ornamental plants. These breeding programmes are housed in formal institutions like universities, parastatal institutions, private companies and individuals. The breeding techniques used vary from basic hybridisation and selection to very sophisticated molecular breeding techniques. The aim of most breeding programmes in our country is heat and drought tolerance. Many breeders aim to combine drought and heat tolerance because in South Africa, the heat is almost always associated with lower rainfall, except in the eastern coastal areas.

#### *2.1.3.3. Promoting diversification of crop production and broadening crop diversity for sustainable agriculture*

Several new challenges have been recognised in the decades that will require straightening diversification. These include the need for long-term sustainability in agricultural practices, the challenge and opportunities posed by the production and use of biofuels, food and nutritional security and rural development and climate change. To cope with such challenges, broader range of crop varieties and species will need to be incorporated into agricultural systems. These include crops to produce raw materials for agro-industry and energy, crops that are currently underutilised, wild food plants and forages. This priority aims to promote sustainable agriculture through diversification among and within crops. Also aim to develop models for diversified production that are consistent with higher productivity and stability as well as meeting consumer



preference.

The NPGRC focuses on conservation of mainly crops for food and fodder, ornamentals, vegetables, cereals and legumes. The NPGRC still need to include wild food plants and underutilised crops in their conservation programme.

#### *2.1.3.4. Promoting development and commercialisation of all varieties, primarily farmers' varieties/landraces and underutilised species*

Commercial production increasingly dominates agricultural systems. In commercial production systems, few major crops provide for a large proportion of global needs. However, many more species including farmers' varieties/landraces of both major and minor crops are used by farmers and indigenous and local communities to meet local demands for food, fibre and medicine.

Under-utilised species, farmers' varieties/landraces and other crop varieties not commonly used in agricultural production systems are being lost, along with associated knowledge. Although there has been a modest increase in efforts to conserve such species *ex situ*, overall, their diversity is not yet adequately represented in collections. Nor are many under-utilised crops included in Annex I of the International Treaty. Nonetheless, many of these species and varieties have great potential for wider use, particularly in breeding, and could contribute significantly to sustainable livelihoods through improved food and nutritional security, income generation and risk mitigation. The priority aims at contributing to sustainable livelihoods, including improved food and nutritional security, income generation and risk mitigation, through the sustainable management of all varieties, focusing primarily on farmers' varieties/landraces and under-utilised varieties.

Improved varieties are promoted more than farmer varieties/landraces and underutilised for commercialisation. Farmer varieties have become less popular due to the promotion of improved varieties, leaving a perception that farmer varieties are inferior to improved, modern varieties. Small-scale farmers depend on local markets and sell among each other or produce for consumption. The NPGRC promotes value and use of farmer varieties through seed fairs.

#### *2.1.3.5. Supporting seed production and distribution*

Effective seed systems must be in place to ensure that farmers have access to planting materials in adequate quantity and quality, in a timely manner and at reasonable cost. Only in this way will farmers benefit from the potential of both local and improved varieties to increase food production and adapt to climate change. The priority aims at addressing an increase in the availability of high-quality seed of a wider range of plant varieties, including improved and farmers' varieties/landraces. Furthermore, it aims to make new crop varieties available to farmers and to make suitable germplasm stored *ex situ* available for multiplication and distribution to farmers to fulfil their needs for suitable crop production.

South Africa has both a formal and informal seed supply system. The formal system is mostly made up of commercial seed companies. The informal seed system hinges on the cultural heritage principle where farmers and communities save, sell and exchange germplasm amongst them. There are also NGOs that actively promote informal seed system in the country. The NPGRC make available suitable germplasm to farmers as needed.

### **2.1.4. Building sustainable institutional and human capacities**

#### *2.1.4.1 Building and strengthening national programmes*

National PGRFA programmes are the foundation of regional and global PGRFA efforts, contributing to the objectives of international instruments such as the CBD and the Global Plan of Action. Strong national programmes are needed to contribute fully to, and take full advantage of, international cooperation on access to PGRFA and the fair and equitable sharing of the benefits arising from their use. Effective national programmes provide the enabling policies, support strategies and concrete actions plans that are necessary for setting well defined goals and clear priorities allocating resources, distributing roles and responsibilities and identifying and strengthening linkages between all relevant stakeholders. A successful national programme requires commitment from governments to provide funding and design supportive policies and legal institutional framework. This priority aims at establishing and strengthening adequate national capacity in all

technical and political aspects of conservation, access and use of PGRFA, as well as the fair and equitable sharing of the benefits arising from that use. Countries should also improve institutional and sectoral linkages, enhance synergies among all stakeholders involved in conserving, developing and using PGRFA, including seed systems and to strengthen the integration of institutional and community efforts.

Several international agreements relating to plant genetic resources have been adopted, including the International Treaty, the Cartagena Protocol on Biosafety and the Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Sharing of Benefits of Benefits Arising from the Utilization. South Africa has ratified the above mentioned instruments except for the International Treaty. National legislation, with respect to access and benefit sharing, biosafety, seed regulations and plant breeders' rights, has been enacted in South Africa. However, there is still a lack of adequate policies, strategies, action plans and programmes for PGRFA.

#### *2.1.4.2. Promoting and strengthening networks for plant genetic resources for food and agriculture*

Regional and international strategies highlight the value of networks in identifying and sharing responsibilities for activities such as collecting, conservation, distribution, evaluation, documentation and crop improvement. Many regional crop specific and thematic networks are now in operation, some of which have been established or significantly strengthened over past decades. Each network has an important network role to play in supporting the coordination effort and promoting cost efficiency and effectiveness in the conservation and sustainable use of PGRFA. This priority focuses on fostering partnerships and synergies among countries in order to develop a more rational and cost effective global system for PGRFA conservation and use. It further aims to promote the participation of all stakeholders in networks, particularly women farmers and local breeders.

South Africa became a member of SPGRC in 1995. The SPGRC coordinates all activities related to in situ and ex situ conservation in the SADC region through network of National Plant Genetic Resources Centre (NPGRC). South Africa actively participates in all activities of the SPGRC.

#### *2.1.4.3. Constructing and strengthening comprehensive information systems for plant genetic resources for food and agriculture*

Transparent and rational decision making in the conservation and sustainable use of PGRFA must be based on reliable information. It is therefore vital that PGRFA information be available and accessible. The Commission has developed WIEWS and adopted indicators and a reporting format for monitoring the implementation of GPA.

This priority aims to facilitate the better management and use of PGRFA through improved access to, and exchange of, high quality, up-to-date information. It further aims to develop and strengthen national information systems including accession level information systems to better manage PGRFA data and to support the parties in global information systems.

South Africa is currently using a regional database SDIS developed by SPGRC for NPGRCs for managing information of all crops that are collected, characterised and duplicated. The database is however only accessible to NPGRC and SPGRC officials.

#### *2.1.4.4 Developing and strengthening systems for monitoring and safeguarding genetic diversity and minimising genetic erosion of plant genetic resources for food and agriculture*

There remains a concern over the extent of genetic erosion of PGRFA due to various factors such as urbanisation, threat of invasive alien species and climate change. Better techniques and indicators are needed for monitoring genetic diversity, for establishing baselines and monitoring trends. This priority aims to effectively monitor genetic diversity and the drivers of genetic erosion and to implement appropriate remedial or preventative action as necessary.

To address issues related to genetic erosion, in 1997 the FAO published WIEWS on the internet, which is the information system used by FAO for the preparation of periodic, country-driven global assessments of the status of conservation and use of PGRFA. South Africa recently started submitting information on WIEWS. South Africa has also developed a National Strategic Action Plan for the Conservation and Sustainable Use



of Crop Wild Relatives in South Africa, identifying the species and populations that are at most risk.

### 3.1.4.5 Building and strengthening human resource capacity

Improvements in PGRFA conservation and use are very dependent on human resource capacity and continuous development. Human capacity is far from adequate in all disciplines related to PGRFA conservation and use. Gene bank staff is often too few and are inadequately trained to collect, classify, conserve, regenerate, characterise, document and distribute PGRFA. Limited taxonomic plant breeding and pre-breeding capacity severely limits the effective sustainable use of PGRFA. On-farm conservation requires that extension services and non-governmental organisations be adequately trained to deliver appropriate training to farming communities. This priority aims to ensure the long term availability of adequate human resource capacity in all areas of PGRFA conservation and use, including management, legal and policy aspects.

The NPGRC has officials adequately trained in most of the gene bank activities. The NPGRC also offers internship opportunities to recently qualified graduates. Expertise on plant breeding and pre-breeding lies with the ARC. There is however, collaboration between the NPGRC and the ARC on relevant aspects of conservation and sustainable use of PGRFA. On-farm conservation activities are led by NPGRC officials, in collaboration with extension services in identified provinces.

### 2.1.4.6. Promoting and strengthening public awareness of the importance of plant genetic resources for food and agriculture

Communicating effectively about the benefits that PGRFA can bring to food security and sustainable livelihoods is crucial to the success of any conservation programme. Raising awareness among policy-makers, donors and the general public of the value of PGRFA is a continuing challenge. Public awareness can support efforts to involve the private sector, indigenous and local communities and non-governmental organisations in national genetic resource activities, therefore ensuring a broader base for conserving and sustainably using PGRFA. This priority aims to ensure continued support for PGRFA conservation and use from policy makers and the general public.

The NPGRC posts information of their activities on the Department of Agriculture, Forestry and Fisheries' website. Information brochures have also been developed for distribution to the public.

All of the above priorities have been consolidated into Table 2, also depicting challenges identified under each priority as well as actions needed to address such challenges.

**Table 2: Challenges identified and actions needed per priority area**

In situ conservation and management		
Priority	Challenges identified	Actions needed
Surveying and inventorying plant genetic resources for food and agriculture	<p>Lack of expertise in technologies such as GIS (for mapping) for conservation of PGRFA</p> <p>Lack of programmes for the assessment of threats to PGRFA</p> <p>Inadequate funding to institute programmes on surveying and inventorying of <i>in situ</i> and <i>ex situ</i> plant genetic resources for food and agriculture</p>	<p>Empower existing staff with new technologies such as GIS</p> <p>Develop scientifically sound and easily implemented indicators for monitoring the status and trends of PGRFA nationally</p> <p>Source funding for surveying and inventorying of PGRFA</p>

Supporting on-farm management and improvement of plant genetic resources for food and agriculture	<p>On-farm activities have been conducted in four provinces (Limpopo, Eastern Cape, KwaZulu-Natal, Mpumalanga)</p> <p>Lack of an approved strategy for conserving PGRFA <i>in situ</i> and for managing crop diversity on-farm</p> <p>Lack of awareness on the role of CSBs in on-farm conservation activities</p>	<p>Formation/establishment of farmer organisations will encourage farmers' participation in on-farm conservation activities</p> <p>Expand on-farm conservation activities to all nine provinces</p> <p>Develop strategy for conserving PGRFA <i>in situ</i> and for managing crop diversity on-farm</p> <p>Promote Community Seed Banks (CSB) as a complementary method of conserving farmers' genetic resources close to where they are needed most</p> <p>Source funding to carry out on-farm activities</p>
Assisting farmers in disaster situations to restore crop systems	<p>Reluctance by farmers to deposit seed to NPGRC and CSB</p> <p>Lack of coordination between NPGRC and NGOs CSB</p>	<p>Develop a strong national network of CSBs that work together with the national gene bank in collaboration with PDAs and NGOs</p> <p>Raise awareness on the importance of CSB and NPGRC, especially in addressing disasters situations</p>
Promoting <i>in situ</i> conservation and management of Crop Wild Relatives and wild food plants	<p>CWR not currently included in the Protected Areas Expansion Strategy</p> <p>Lack of awareness amongst stakeholders about the value of CWR</p> <p>Limited knowledge on how to differentiate CWR relatives from indigenous crops relatives and their utilisation</p> <p>Lack of checklist for timber and ornamental species CWR</p>	<p>Facilitate the implementation of CWR NSAP</p> <p>Develop timber and ornamental species CWR checklist</p>

***Ex situ conservation***

Priority	Challenges identified	Actions needed
Supporting targeted collecting of plant genetic resources for food and agriculture	<p>Inadequate funding and resources to carry out targeted collections</p> <p>Low representation of Crop Wild Relatives, medicinal plants and vegetatively propagated species in <i>ex situ</i> collection of the NPGRC</p>	<p>Prioritise target collection missions in operational budgets</p> <p>Identify priorities for targeted collecting in terms of missing diversity</p>
Sustaining and expanding <i>ex situ</i> conservation of germplasm	<p>Lack of systems to ensure that active collection held at research institutes is duplicated at NPGRC</p> <p>Coordination on <i>ex situ</i> field gene banks and <i>ex situ</i> seed banks is lacking</p> <p>Lack of fully functional <i>in vitro</i> and molecular laboratories</p> <p>Lack of conservation protocols for vegetative propagated species</p>	<p>Establish base collection of research institute collections at the NPGRC</p> <p>Explore mutual cooperation and collaboration among officials in various gene banks within the country</p> <p>Source sufficient funding for collections, research, and upkeep of gene bank facility and equipment</p> <p>Establish national links to improve the safety of existing collections for <i>ex situ</i> field gene banks and <i>ex situ</i> seed banks</p> <p>Conduct research on conservation protocols for vegetative propagated species</p>

Regeneration and multiplication of <i>ex situ</i> accessions	<p>Limited land space to carry out regenerations and multiplication</p> <p>Multiplication does not yield required seed quantities for conservation, distribution and safety back up from a single cycle</p> <p>Inadequate human capacity to carry out regeneration and multiplication activities</p>	<p>Obtain buy in from PDAs and farmers to carry out on regeneration and multiplication</p> <p>Source additional land space, e.g., farmers and other institutions</p> <p>Involve farmers in regeneration and multiplication through incentive programmes</p>
Sustainable development		
Priority	Challenges Identified	Actions needed
Expanding characterisation, evaluation and further development of specific subsets of collections to facilitate use	<p>Few crop species of gene bank accessions have been characterised</p> <p>NPGRC has not focused on evaluation and further development</p> <p>Lack of capacity of the NPGRC to conduct crop improvement</p>	<p>Increase the number of species to be characterised</p> <p>Include evaluations and further development on operational plans</p> <p>Establish national links to conduct evaluation of NPGRC accessions</p>
Supporting plant breeding, genetic enhancement and base-broadening efforts	<p>Information on pre-breeding and participatory plant breeding activities is scanty</p> <p>Lack of policies and regulatory frameworks that support participatory plant breeding programmes</p>	<p>NPGRC to introduce and develop policies and legislation that support participatory and plant breeding programmes</p> <p>NPGRC need to collaborate with other relevant stakeholders on projects related to crop improvement programmes</p>
Promoting diversification of crop production and broadening crop diversity for sustainable agriculture	<p>Lack of programmes to promote diversification of crop production</p> <p>Inadequate capacity to regularly monitor genetic vulnerability and diversity</p> <p>Limited research on domesticating wild species</p> <p>Lack of collaboration between NPGRC and other relevant stakeholders on strategies for diversification of crop production for sustainable agriculture</p>	<p>Foster collaboration between NPGRC and relevant stakeholders on programmes, research and promotion of crop diversification for sustainable agriculture</p> <p>Raise awareness on the value of crop diversification</p>
Promoting development and commercialisation of all varieties, primarily farmers' varieties/landraces and underutilised species	<p>Limited national programmes that promote farmers' varieties for formal and informal markets</p> <p>Little value attached to farmer varieties/landraces to enable the promotion of commercialisation</p> <p>Poor documentation of indigenous skills utilised in development of farmer varieties</p>	<p>Increase awareness to the public and among policy makers of the importance of farmers' varieties/landraces and underutilised species.</p> <p>Facilitate and encourage participatory breeding programmes</p> <p>Promote commercialisation and distribution of farmer varieties/landraces</p> <p>Proper documentation of indigenous knowledge used in development of farmer varieties</p> <p>Collaborate with relevant stakeholders in identifying possibilities for development and commercialisation</p>
Supporting seed production and distribution	<p>Lack of coordinated effort in supporting informal seed production and distribution</p> <p>Limited awareness on the role of NPGRC in supporting seed distribution</p>	<p>Encourage collaboration on formal seed systems programmes</p> <p>Promote public awareness on the role of NPGRC</p> <p>Promote community-based seed production schemes, primarily on underutilised crops</p>

**Building sustainable institutional and human capacities**

<b>Priorities</b>	<b>Challenges Identified</b>	<b>Actions Needed</b>
Building and strengthening national programmes	<p>Inadequate coordination and linkages among stakeholders involved in conservation and sustainable use of PGRA</p> <p>South Africa is not party to the International Treaty</p> <p>Lack of national legislation and/or inadequate policies with respect to access and benefit sharing arising from utilisation of PGRFA and farmers' rights</p>	<p>Revival of the NPGRCOM</p> <p>Explore collaboration opportunities at regional and international level</p> <p>Assess benefits of membership to the International Treaty with recommendations to DAFF International Cooperation Committee</p> <p>Development of relevant policies to address access and benefit sharing and farmers' rights</p>
Promoting and strengthening networks for plant genetic resources for food and agriculture	<p>Limited partnerships and synergies with other countries</p> <p>Limited participation of farmers and local breeders</p> <p>Limited financial resources for activities such as development of promotional material, publications and travel</p>	<p>Explore opportunities to partner with other countries on relevant activities</p> <p>Encourage participation of farmers and local breeders</p> <p>Source funding for relevant activities</p>
Constructing and strengthening comprehensive information systems for plant genetic resources for food and agriculture	<p>Information not readily available to local communities and stakeholders</p> <p>Gaps in documentation of some accessions</p>	<p>Facilitate accessibility of accession-level information to local communities and stakeholders through various media and channels.</p> <p>Document missing information where possible</p>
Developing and strengthening systems for monitoring and safeguarding genetic diversity and minimising genetic erosion of plant genetic resources for food and agriculture	<p>Inadequate mechanisms to identify populations that are most at risk, with regards to farmers' varieties/landraces</p> <p>Lack of coordinated approach between the NPGRC and other stakeholders, e.g., extension services, farming communities, etc. to monitor genetic diversity over time and develop early warning systems</p>	<p>Train relevant officials and stakeholders on monitoring mechanisms</p> <p>Collaboration between relevant stakeholders to strengthen monitoring systems</p>
Building and strengthening human resource capacity	<p>Inadequate training of NPGRC officials on aspects such as taxonomic identification, GPS techniques, monitoring, etc.</p> <p>Inadequate training of extension services on on-farm conservation</p>	<p>Identify training opportunities at national, regional and international level for NPGRC officials and extension services</p> <p>Train and encourage extension services to lead provincial on-farm conservation activities</p>
Promoting and strengthening public awareness of the importance of plant genetic resources for food and agriculture	<p>Inadequate assessment of the full value of PGRFA and the impact of their use</p> <p>Lack of targeted public awareness programme, with roles that need to be played by all stakeholders</p> <p>Public awareness material is mostly produced in English</p>	<p>Conduct a national study on the socioeconomic value of PGRFA</p> <p>Establish targeted awareness programme on PGRFA and identify appropriate media to cover PGRFA issues</p> <p>Develop/translate material into indigenous/local languages</p>

## CHAPTER 3

### IMPLEMENTATION OF THE NATION PLAN FOR CONSERVATION AND SUSTAINABLE USE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

#### 3.1 Implementation plan

The National Plan shall be implemented by DAFF: NPGRC with support and cooperation from other stakeholders such as PDAs, NGOs, farming communities, research institutions, etc. The implementation plan for the period 2018 to 2027 is presented in Table 3.

**Table 3: The implementation plan for the National Plan for the conservation and sustainable use of PGRFA**

Activity	Time frame	Management responsibility	Output	Estimated budget (R)
<b>ENABLING FRAMEWORK</b>				
Develop a policy on farmers' rights in relation to conservation and sustainable use of PGRFA	2018-2020	DAFF	National Policy on Farmers' Rights	R50 000
Conduct an assessment on benefits of membership to the ITPGRFA	2018-2021	DAFF	Report on the study submitted to International Co-operation Committee (ICC)	R50 000
Revive the National Committee for PGRFA (NPGRCCom)	2018-2019	DAFF	NPGRCCom	R10 000
Review Material Transfer Agreement to enable access of material by farming communities	2018-2019	DAFF	Reviewed MTA	R2 000
<b>ON FARM/IN SITU CONSERVATION AND MANAGEMENT</b>				
Systematic inventories of farmers/traditional varieties including underutilised crops	2018-2027	DAFF PDAs	At least one inventory for each province	R100 000
Facilitate establishment of farmer organisations and/or Community Seed Banks for participation in on-farm activities	2018-2027	DAFF PDAs	At least one in all provinces (except for Eastern Cape and Limpopo, where already established)	R100 000
Develop a strategy for conserving PGRFA in- situ and for managing crop diversity on farm	2018-2022	DAFF	Strategy on on-farm/in situ conservation	R50 000
Facilitate the implementation of the NSAP on conservation and sustainable use of Crop Wild Relatives	2018-2022	DAFF	Implementation of activities identified in the NSAP	R100 000
<b>EX SITU CONSERVATION</b>				
Conduct targeted collections for crops under-represented in ex situ collection of the NPGRC	2018-2027	DAFF	Number of species conserved	R250 000
Conduct multiplication and characterisation of accessions	2018-2027	DAFF	Number of accessions multiplied and characterised	R200 000

Ensure that accessions are duplicated and duplicates are deposited at SPGRC	2018-2027	DAFF	Number of accessions deposited at SPGRC	R100 000
Develop Standard Operation Procedures for relevant gene bank (ex- situ) activities	2018-2022	DAFF	Number of SOPs developed	R20 000
Collaborate with various gene banks within the country to improve management of ex situ collections	2018-2027	DAFF	Information exchange among gene banks and number of accessions deposited by research institutes at NPGRC	R50 000
<b>SUSTAINABLE USE</b>				
Facilitate programmes in participatory plant breeding	2018-2027	DAFF	At least two communities involved in participatory plant breeding	R100 000
Conduct a national study on socioeconomic value of PGRFA and impact of their use	2018-2020	DAFF	Publication on socioeconomic value of PGRFA	R50 000
Collaborate with other stakeholders on the promotion of diversification, development and commercialisation of farmer/traditional varieties and underutilised species	2018-2027	DAFF	Number of projects involving promotion of traditional varieties and underutilised species	R100 000
<b>CAPACITY BUILDING AND INSTITUTIONAL STRENGTHENING</b>				
Improve identified technical skills for NPGRC officials and extension services	2018-2022	DAFF PDAs	Number of trained officials	R100 000
Explore collaboration opportunities at national, regional and international level	2018-2022	DAFF	Improved capacities	R100 000
Facilitate accessibility of accession level information to local communities and other stakeholders	2018-2022	DAFF	Information on accessions held at NPGRC easily accessible to stakeholders	R50 000
Develop a targeted awareness programme to promote PGRFA activities to 2027 and beyond	2018-2019	DAFF	Targeted awareness programme	R2 000
Translate information brochures into indigenous/local languages and distribute to relevant communities	2018-2022	DAFF	At least one local language per province	R100 000
<b>RESOURCE MOBILISATION</b>				
Develop a financial strategy to sustain PGRFA activities to 2027 and beyond	2018-2020	DAFF	Detailed financial plan	R2 000
<b>TOTAL</b>				<b>R1 686 000.00</b>

### 3.2 The roles and responsibilities of the stakeholders

The Department of Agriculture, Forestry and Fisheries will lead the implementation of the National Plan for conservation and sustainable use of Plant Genetic Resource for Food and Agriculture (PGRFA). The possible roles and responsibilities of other stakeholders are summarised in Table 4.

**Table 4: Stakeholders and their possible roles in conservation and sustainable use programmes of PGRFA.**

Stakeholders	Roles
DAFF	Lead and coordinate all activities
SANBI	Provide training on taxonomic identification and collaborate on relevant projects
ARC	Collaborate on participatory plant breeding programmes, conduct research on and pre-breeding of identified crops
Provincial Departments of Agriculture	Implement on-farm activities, promote awareness on PGRFA
Farmers/communities	Participate in on-farm activities and participatory plant breeding programmes
Non-Governmental Organisations	Implement on-farm activities, promote awareness on PGRFA, conduct research on sustainable use of PGRFA
Universities	Conduct research on and pre-breeding of identified crops.
Funding agencies	Fund various projects pertaining to conservation and sustainable use of PGRFA

### 3.3 Financial implications

Implementation of the National Plan will require financial resources from DAFF and potential donors to fast track the process.

### 3.4 Communication implications

The final draft document, with inputs and comments from relevant stakeholders incorporated, will be submitted and presented to DAFF's relevant committees (e.g. ASRDC/STC) and to the Executive Committee (EXCO) for approval. DAFF as the custodian of this plan will play a leading role in the dissemination of the approved final National Plan to all relevant stakeholders.

### 3.5 Monitoring and Evaluation

Effective monitoring of the implementation of the National Plan for PGRFA would require collaborative efforts from all stakeholders. DAFF will be responsible for leading the implementation and monitoring of the National Plan. The focal point will be the NPGRC of the Directorate: Genetic Resources, which has the national mandate for the conservation and sustainable use of PGRFA in the country. The following measures will be used to monitor and evaluate the implementation and effect of the National Plan, which includes (i) regular site visits and (ii) monthly reporting on the status of implementation, reflecting on achievements and challenges, amongst others. The National Plant Genetic Resources Committee (NPGRCCom) will monitor and evaluate the implementation of the National Plan.

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