

BCN



UNDERUTILIZED SPECIES POLICIES AND STRATEGIES

**Analysis of existing national policies and legislation that
enable or inhibit the wider use of underutilized plant species
for food and agriculture in Zambia**



Report

Prepared by

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Analysis of existing national and institutional policies that enable or inhibit the wider use of underutilized plant species for food and agriculture in Zambia

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Abbreviations and Acronyms

AABNF	African Association for Biological Nitrogen Fixation
ABS	Access and Benefit Sharing
AEZ	Agro-Ecological Zones
AFNETA	Alley Farming Network for Tropical Africa
AFRENA	Agro-Forestry Research Network for East and Central Africa
ALV	African Leafy Vegetables
ASIP	Agricultural Sector Investment Programme
BCN	Biodiversity Community Network
BSAP	Biodiversity Strategy and Action Plan
CARE	Cooperative for Assistance and Care Everywhere, inc.
DED	German Development Service
DFS	Department of Field Services
ECZ	Environment Council of Zambia
EEP	Environmental Education Plan
EIA	Environmental Impact Assessment(s)
EPA	Educational and Public Awareness
FAO	Food and Agriculture Organization of the United Nations
FNDP	Fifth National Development Plan
FRA	Food Reserve Agency
GDP	Gross domestic product
GFU	Global Facilitation Unit for Underutilized Species
GRZ	Gold Reserve, Inc.
HF	Henwood Foundation
HHSAF	Harvest Help Sustainable Agriculture Forum
HEPS	High Energy Protein Supplement
IBSRAM	International Board for Soil Research Management
ICN	International Conference on Nutrition
IDD	Iodine Deficiency Disorder
IKS	Indigenous Knowledge Systems
IMF	International Monetary Fund
IRD	Integrated Rural Development Programme
JFM	Joint Forest Management
KZF	Keepers Zambia Foundation
LWF	Lutheran World Foundation
MACo	Ministry of Agriculture and Cooperatives
MADS-SEA	Management of Degraded Soils in East and Southern Africa
MCDSS	Ministry of Community Development and Social Services
MSTVT	Ministry of Science, Technology and Vocational Training
MTENR	Ministry of Tourism, Environment and Natural Resources
NAMBoard	National Agricultural Marketing Board
NAP	National Agricultural Policy
NEAP	National Environment Action Plan
NGO	Non-Governmental Organization
NISIR	National Institute for Scientific and Industrial Research
NLWCCDP	North Luangwa Wildlife Conservation and Community Development Programme
NPGRC	National Plant Genetic Resources Centre
NPGRP	National Plant Genetic Resources Programme
NSTC	National Science and Technology Council
OPAD	Organization for Promotion of Meaningful Development by Active Participation
OPPAZ	Organic Producers and Processors Association of Zambia
PAM	Program Against Malnutrition
PELUM	Participatory Ecological Land Use Management

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PEM	Protein-Energy Malnutrition
PGR	Plant Genetic Resources
R&D	Research and Development
RENEASA	Rhizobium Ecology Network for East and Southern Africa
SADC	Southern African Development Community
SAP	Structural Adjustment Policies
SOIL FERT NET	Soil Fertility Network
SPALINA	Soil and Plant analytical Laboratories Network of Africa
SPGRC	SADC Plant Genetic Resources Centre
THPAZ	Traditional Healers and Practitioners Association of Zambia
TNDP	Transitional National Development Plan
TSBF-AfNET	Tropical Soil Biology and Fertility African Network
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNZA	University of Zambia
VRP	Vegetable Research Programme
WCZS	Wildlife Conservation Society of Zambia
WHO	World Health Organization
WVI	World Vision International
ZARI	Zambia Agricultural Research Institute
ZaSTA	Zambia Seed Trade Association
ZAWA	Zambia Wildlife Authority
ZBEC	Zambia Basic Education Curriculum
ZCF	Zambia Cooperative Federation
ZNFU	Zambia National Farmers Union

ABSTRACT

In order to increase the contribution of potentially valuable and presently underutilized plant species to improve the livelihoods, food security, nutrition/health and household income status of the poor majority in Zambia, and to enhance the conservation of Plant Genetic Resources (PGR), it is necessary to have policy and legislation that is supportive to the utilization of such underutilized plant species. To contribute to this end, this study is commissioned by the Global Facilitation Unit for Underutilized Species (GFU) and carried out by the Biodiversity Community Network (BCN) in cooperation with the National Plant Genetic Resources Center (NPGRC) with technical support from SADC Plant Genetic Resources Center (SPGRC). Its aim is to identify the national and institutional policies and legislative frameworks in Zambia that have a direct or indirect impact on the utilization of currently underutilized plant species. Based on these findings, recommendations will be developed to assist government and institutional planners in strengthening and formulating policies that support the utilization of underutilized plants in Zambia.

The project study has basically involved literature search and the review of documents from government institutions, the private sector and NGOs, as well as follow-up consultations by the Project Team with various institutions and individuals (*see Annex A: Discussion themes*). Preliminary research on a few underutilized species has been done by the Vegetable Research Programme (VRP) of the Zambia Agriculture Research Institute (ZARI), the University of Zambia (UNZA) School of Agriculture, on Cowpea and Amaranthus and the National Institute for Scientific and Industrial Research (NISIR) and NPGRC, on ground orchids (*Disa*, *Habenaria*. and *Satyrium* species.)

An analysis was undertaken of the relevant policies under the agriculture, health and education sectors as they relate to underutilized plant species. None of these sectorial policies make specific reference to underutilized plant species. Only in some policies are underutilized plants mentioned, either indirectly or in general.

The agricultural policy of 2004 acknowledges the importance of underutilized plants through the food security objective, which states the need to promote production of diversified crop species including cereals, legumes, roots and tubers. The other objective stresses the need to increase and diversify agricultural exports, including those derived from minor crops such as essential oils, species and vegetables. In terms of enhancing crop production the agriculture policy provides diversification and maintenance of agrobiodiversity as some of the key strategies. This includes the need to develop measures to conserve and utilize locally-available agrobiodiversity. Both the R&D and Extension institutions under the Ministry of Agriculture and Cooperatives (MACo) have policy objectives that promote crop diversification.

The National Nutrition Policy, developed in 2006 under the Ministry of Health, recognizes the fact that food entitlement for most rural households is linked to agriculture. The policy states that production of minor staple food crops has been fluctuating and at a low level, leading to increased vulnerability to food insecurity, especially among the rural population. Policy measures indicated include the need to promote increased food diversification, production and consumption, and the utilization of all available food resources in order to improve nutrition status. Although there is no specific mention of underutilized plants it is clear that the policy does so in its objectives, which aim at addressing the current nutritional problems or issues.

The National Education Policy of 1996 includes the aspect of environmental health for the pupils and for the communities/households from which they come. The policy recognizes that good pupil, community and societal health are dependent on a health environment. In addressing issues related to this the Ministry of Education will strive to cooperate with the line Ministries of Environment, Community Development, Agriculture and others in the improvement of nutritional status and other health-related matters. The policy does not include anything on school feeding programmes.

KEY WORDS:

Country/Region: Zambia
Crops/Plants: Underutilized Crop and Plant Species
Subject: Policy Analysis
Content: Plant Genetic Resources (PGR) Issues, and
Socio-Economics and Community Issues

1. INTRODUCTION

Ecogeography and socio-cultural context

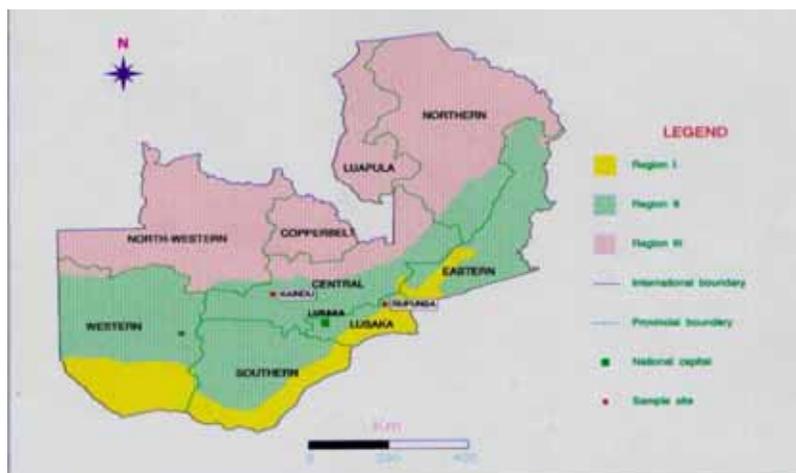
Zambia is a land of ecological and cultural diversity: It lies at 8°-18° South (S) and 22°-30° East (E) as a landlocked country of 752,614 km² situated on the Central-Southern African plateau of between 1000-1600 meters above sea level (asl) giving it a moderately cool subtropical climate with three seasons. The cool-dry season is from April to August, the hot-dry season from August to November and the hot-wet season from November to April with mean annual rainfall varying from 700 mm (S) to 1500 mm in the North (N), and mean annual temperature range of 20°C-30°C.

Zambia has a favourable climate and diverse ecological landscapes. The major Savanna biome consists of sixteen (16) ecosystem types and lies in the Zambezian centre of plant endemism, between the Guinea-Congolian zone in the north and the Karoo-Namib zone in the south. Soils include *Ferrasols* in the north, *Arenosols* in the west, and *Acrisols* and *Luvissols* in the east. *Ferrasols* and *Lithosols* are found on the eastern plateaux while the valleys and floodplains have *Vertisols* (FAO & UNESCO 1975).

Situated on the Central African plateau, Zambia benefits from inter-regional transitions of the broad *ecozones* of floristic diversity from the neighbouring centers of plant endemism (BSAP 1998): It is traversed and incised by numerous rivers including the Zambezi, Kafue, Luangwa and Chambeshi rivers forming varied topography from extensive valleys and wetlands through the grasslands and woodlands (with *Miombo-Brachystegia*, constituting 66%) to the escarpments, all of which form various landscapes and habitats to a diverse range of plant genetic resources. Out of the recorded 5500 flowering plants, 88 mosses and 146 ferns, cultivated plants constitute 2.3% of this diversity, which is dominantly in the hands of indigenous local communities and smallholder farmers.

Zambia has three (3) distinguished Agro-Ecological Zones (AEZ): I, II and III. AEZ I covers Zambezi and Luangwa valleys, AEZ II includes the main plateau areas of Central, Eastern and parts of Southern provinces, and AEZ III is dominantly the Northern, Luapula, Copperbelt and North-Western provinces (Figure 1).

Figure 1: Agro-Ecological Zones of Zambia



Zambia has over 72 *Bantu* ethnic groups (tribes) who, with the support of appropriate ecological and climatic conditions, have been responsible for the development of some 100 cultivated plants including the semi-cultivated crops and useful semi-wild plants. Crops are cultivated predominantly on a small-scale (1.0 -2.5 ha) in varying degrees according to the socio-cultural settings, Agro-Ecological Zones (AEZs), local suitability and adaptability, and the rainfall patterns.

The PGR diversity forms the basis for meeting household and national food security, alternative livelihoods, human nutrition and health requirements, including the fight against HIV/AIDS. It is also a source of generating household income for more than 85% of the Zambian population, especially for women and female-headed households accounting for between 30%-40% of the Zambian population (CSO 2002/2003).

Overview of agriculture

Farming in Zambia, especially that concerned with food production, is mainly in the hands of small-scale farmers and still largely based on traditional practices. These farmers and the local communities in which they live have contributed to the development and maintenance of a rich crop genetic diversity on which they have depended for their livelihoods in general and food security in particular.

Traditionally, the local communities derive their livelihoods from a wide range of plants for food and other uses. These include those that are cultivated or semi cultivated and useful plants gathered from the wild. A number of these crops would fall within the category of underutilized plants, as limited attention has been paid to them in terms of development and improvement research, financing and marketing support, leading to low level production and utilization.

Agriculture - and in particular crop production for food - plays an important role in supporting the livelihoods of most Zambian people, particularly those in rural areas. Although there is a wide diversity in terms of crop species available in most communities, not all are utilized at optimum levels. The underutilization of the majority of the crops and plants can be attributed to a number of policy, institutional and other related factors. Maize, for instance, is historically the most widely-produced and consumed staple food crop across the country, while the sorghum, millet and cassava staples, considered to be more of the traditional staple crops, have a localised production and consumption. In general, these and many other food crops found in Zambia could be considered to be underutilised because of their localised utilization in terms of R&D, cultivation, processing, marketing and consumption. Other underutilized species with great potential for food security, nutrition, health, and income generation include the carbohydrate calorie-rich root tubers such as wild yam (*Dioscorea spp.*), livingstone potato (*Plectranthus esculentus*) and sweet potato (*Ipomoea batatas*). Others include edible grain (of the wild grasses of *Panicum repens* and *P. milaceum*) and many indigenous *African Leafy Vegetables* (ALVs) including various species of *Amaranthus*, *Cleome* and *Corchorus s.*

Important traditional food crops cultivated across the country providing main sources of food apart from maize include sorghum, pearl millet, finger millet, cassava, groundnuts, and common bean. Over the years, farming for crop production in Zambia has been biased towards maize production. This emphasis led to the neglect of other traditional crops important for food security. Maize has been the major crop of focus in Zambia for the provision of food, especially to the urban population. Other major crops produced, rather on limited scale for commercial purposes, include cotton, groundnuts, tobacco and a range of horticultural crops mainly intended for the export market. Within this scenario, the failure in maize production inevitably led to deterioration of the food security situation both at household and national levels. The promotion of maize production was characterized by subsidies on inputs such as fertilizers and seed.

On average, the agricultural sector employs about 67% of the labour force and remains the main source of income and employment for most of the people in rural areas. In general, there is a favourable environment for achieving substantial progress in the agricultural sector in Zambia. Recent strategies towards increasing and sustaining agricultural production include the need to diversify into crops other than maize.

Figure 2: Some traditional food crops found in Zambia



Sorghum

Pearl millet

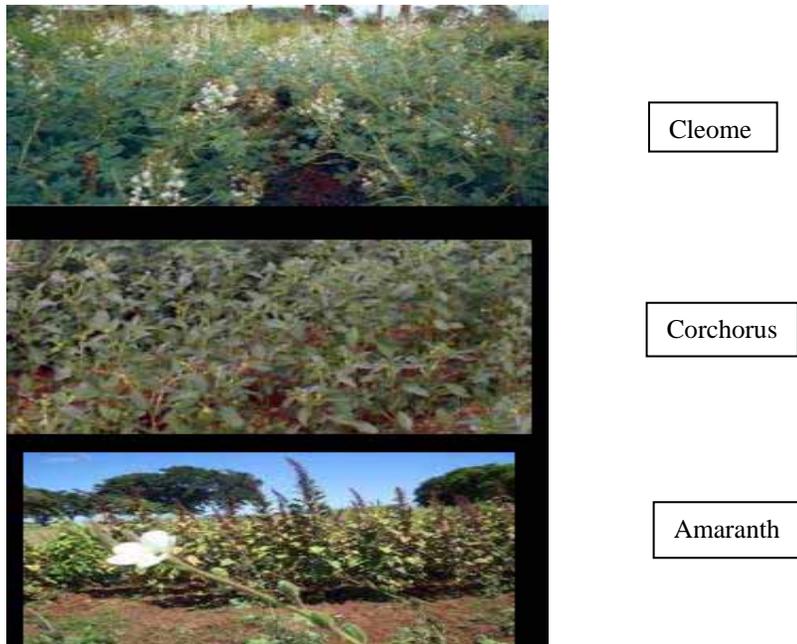
Common bean

Status of underutilized plant species

Although it is generally accepted that there are crops and plants falling within the category of underutilised species, there is no agreed list of these species in the Zambian context. There are a number of plant species that have been variously described as being underutilised in Zambia. The categorisation of plant species as underutilised has been based on a number of criteria including the extent of cultivation, level of production, market support both for inputs and produce, extent of utilisation or consumption and attention received in terms of R&D.

Available literature reveals that there are about 5,500 flowering plants, 88 mosses and 146 ferns, constituting some 47% of the 8,017 known plant and animal species; and these cultivated crops and useful semi-cultivated plants form 2.3%. (A similar statement is made above). Genetic diversity in cultivated crops is brought about by a number of factors, which include cultural and ethnic variations including traditional farming systems. For example, cowpea (*Vigna unguiculata*) is traditionally cultivated around the royal court of the Bemba paramount chief *Chitimukulu* and is used for the cultural and religious ritual during the embalming of the chief's body; while across all ethnic groups semi-cultivated and semi-wild plants such as *Cleome spp.*, *Corchorus spp.*, and *Amaranthus spp.* (Figure 2) are nurtured and utilized from the edge of homesteads, farm plots, backyards and the edges of village forests.

Figure 3: Semi-Cultivated Crops and Semi-Wild Plants



Other crops are conserved because local people or particular clans are named after the names of these crops: A particular sorghum (*Sorghum bicolor*) variety, “Sonkwe”, is traditionally cultivated among the Sonkwe clan to perpetuate their clan. In addition, the diverse soil types, the evolving traditional farming systems and ethnic groups, form an effective selective force necessary for the creation of the valuable genetic diversity in many cultivated crops and useful semi-cultivated plants. Traditional farmers select crops and varieties to meet different requirements such as yield, early maturity, ease of cultivation, processing, human nutrition and good taste or flavour. Crops and varieties are also shaped through natural selection influenced by factors such as disease and insect pest pressure, rainfall amount and patterns, and the local soil types.

Thus, the process of plant domestication and crop cultivation, adaptation and utilization over many generations has resulted in the development of useful genetic diversity manifested in the form of local traditional crops and varieties, which need to be conserved. This diversity is understood to be crops and varieties that have developed distinct characteristics and occur within the defined local communities or geographical areas. These are distinguished by the set of useful traits and exist as composite or mixed genetic material, and tend to have specific adaptation in terms of ecogeographical areas. Table 1 shows some of the underutilized crops and plants held in the National Genebank.

Table 1: Sample of underutilized plant species found in Zambia

Plant Species		Common Name
Cereals	<i>Eleusine coracana</i> <i>Pennisetum glaucum</i> <i>Sorghum bicolor</i>	Finger millet Pearl millet Sorghum
Oil crops	<i>Carthamus tinctorius</i> <i>Jatropha curcas</i> <i>Sesamum indicum</i>	Safflower Physic nut Sesame
Pulses	<i>Cajanus cajan</i> <i>Lablab purpureus</i> <i>Mucuna</i> spp. <i>Vicia faba</i> <i>Vigna subterranea</i> <i>Vigna unguiculata</i>	Pigeon pea <i>Lablab</i> Velvet beans Faba beans Bambara groundnuts Cowpea
Tuber crops	<i>Dioscorea</i> spp. <i>Plectranthus esculentus</i> <i>Solenostemon rotundifolia</i>	Yams Livingstone potato
African Leafy Vegetables (ALV)	<i>Amaranthus</i> spp. <i>Brassica carinata</i> <i>Corchorus olitorius</i> <i>Crotalaria brevidens</i> <i>Cleome gynandra</i> <i>Solanum aethiopicum</i> <i>Cucumis</i> spp.	Amaranthus Ethiopian mustard Vegetable jute Crotalaria Cat's whiskers African eggplant Cucumbers
Fruit trees	<i>Adansonia digitata</i> <i>Artocarpus heterophyllus</i> <i>Tamarindus indica</i> <i>Ziziphus mauritiana</i>	Baobab Jack fruit Tamarind Ziziphus

Source: NPGRC 2005

These crops and plants are normally used for food and agriculture and include those whose fruits, nuts, leaves, roots, tubers, stems, flowers, seeds, pods, shoots, buds, etc. are socially and culturally accepted and consumed as foods and/or relish ingredients, and also utilized as medicinal plants both by the rural and urban communities and households through custom, habit and tradition. Some of these underutilized species were once widely cultivated locally but fell into neglect over time, due to various factors, mainly stemming from competition from new species supported by policy change. Most of these underutilized crops became commercially uncompetitive and, as such, less attractive to most farmers, in particular large scale commercial farmers (Mnzava 1995). There has also been a change in consumer tastes influenced by the changing food cultures. This has been compounded by Zambia's very high rate of urbanization.

The plant diversity of underutilized plants has been subjected to erosion and loss due to a number of factors, including the following:

- (1) Increased land-clearing which destroys useful plants and habitats through unsustainable agricultural practices such as the traditional slash-and-burn "Chitemene" shifting cultivation systems in AEZ III in the high rainfall areas.

The slash-and-burn Chitemene and the semi-permanent grass mound Fundikila systems practiced in forested and deforested areas, respectively, have the estimated carrying capacity of 2.4 persons per km² and 6.5 persons per km² respectively, and land degradation occurs when carrying capacities are exceeded (Mapiki, Mukanda & Mwale 2000). Other major land developments, such as stone quarrying and road construction, also lead to fragmentation or disturbed habitats for plants especially in the absence of Environmental Impact Assessments (EIAs).

- (2) Overemphasis and introduction of mono-cropped high-input uniform (hybrid) varieties, such as maize, tobacco and cotton. Among the anthropogenic causes of chemical land degradation, the problem of soil acidification is accentuated by the use of Nitrogen (N) fertilizers and is estimated to have resulted in the loss of 15% of arable land over the past 20 years.
- (3) Occurrence of natural disasters as a result of climate change, leading to extreme weather patterns such as droughts and floods.
- (4) Land degradation through improper land management practices, causing soil erosion and annual bush-fires which decimate younger plants that are neither fire-nor drought-tolerant; and the over-harvesting of wild species such as edible ground orchids (*Disa spp.*, *Habenaria spp.*, *Satyrium spp.*) and the wild yams (*Discorea hirtiflora*). Habitats to the edible Orchid species are being destroyed through conversion of *Dambo* and peat bog areas to the cultivation of *Paddy* rice, extensive livestock grazing and annual bushfires.

The realization that the majority of crops and plant species were threatened leading to loss of some of them and because of their important roles in meeting the needs of food security, livelihoods, nutrition and health and income generation of the majority of the people in Zambia both in the urban and rural areas, prompted by the rising domestic production costs and falling of the World Copper Prices (1975) led the government to shift its development emphasis from copper mining to agriculture and to initiate programmes aimed at promoting major crops in terms of R&D, production and utilization.

Starting from the 1980s public institutions in the Ministry of Agriculture and Cooperatives (MACo) and other relevant line Ministries and parastatal companies focused on high commercial value crops like maize, groundnut, cotton, tobacco and sunflower which received support in terms of crop improvement research, subsidies, credit, extension, transport and market arrangements.

After the 1990s, faced with the experience of recurrent droughts, resulting in crop failures especially for maize, increasing input costs and the widespread malnutrition levels (affecting up to 42% of the child population), government has had renewed interest and focus in promoting the traditional staple food crops such as sorghum, millets and root tubers. These policy changes were espoused through the National Environment Action Plan (NEAP 1994) and Agricultural Sector Investment Programme (ASIP 1995), which espoused among other policy thrusts, the diversification of crop production and promotion of mixed farming, the reorganization of management and delivery of key support services especially agricultural research, extension and on-farm credit focusing on incentive measures to help build capacity among the bulk of smallholder farmers and women.

This included the need to review and update policies and laws relating to cooperatives, marketing, credit, seeds and fertilizer and feed regulations, which also meant restructuring and improving the Ministry of Agriculture and Cooperatives (MACo) and its various Departments. These include the Department of Field Services (DFS), which deals with extension, and the Zambia Agricultural Research Institute (ZARI), which deals with agricultural research.

In terms of this study, the key sectorial policies and institutional measures that may have some relevance or impact on the production and use of the underutilised crop and plant species in Zambia are agriculture, environment, health, education and community development. However, as noted in the above, the consideration of underutilized species is considered as part of the whole crop production or as part of the crop diversification strategies to increase food security, and to enable communities/households to deal with fluctuating economic and weather conditions.

Study objectives

The overall objective of the study is to promote the wider and increased utilization of the underutilized crop and plant species through appropriate policy and legislative reforms.

The specific objectives of the study are:

To review and analyse the national and institutional policy frameworks that have implications for the development, improvement and utilization of the underutilised crop and plant species.

To recommend appropriate policy measures for the promotion of underutilized crop and plant species for food and agriculture in Zambia.

To sensitise policy makers, NGOs, R&D agencies, the private sector and farmers, on the values and benefits of underutilized crop and plant species and the associated indigenous knowledge systems.

II. STATUS OF CROP DIVERSITY

There are about 100 cultivated crops and semi-cultivated plants found in Zambia. Most of these are underutilized. Of the 100 known crops, 15% are indigenous, e.g. sorghum (*Sorghum bicolor*), pearl millet (*Pennisetum glaucum*), cowpea (*Vigna unguiculata*), bambaranut (*V. subterranean*), sesame (*Sesamum indicum*) and a range of African Leafy Vegetables, 75% are exotic of which 7% are naturalised, such as maize (*Zea mays*), common bean (*Phaseolus vulgaris*), groundnut (*Arachis hypogaea*), cassava (*Manihot esculenta*) and sweet potato (*Ipomoea batatas*). The wild relatives include those of rice (*Oryza sativa*), cucurbits (*Cucumis* spp.), cowpea (*Vigna unguiculata*), sorghum (*Sorghum bicolor*), sesame (*Sesemum indicum*) and kenaf (*Hibiscus cannabinus*). A range of indigenous fruit trees that are semi-cultivated or gathered from the wild are also found throughout the country including wild loquat (*Uapaca kirkiana*), baobab (*Adansonia digitata*), Tamarind (*Tamarindus indica*) and Ziziphus (*Ziziphus mauritiana*).

Table 2 summarizes some of the range of crops and plant species cultivated and naturally occurring in Zambia over many years.

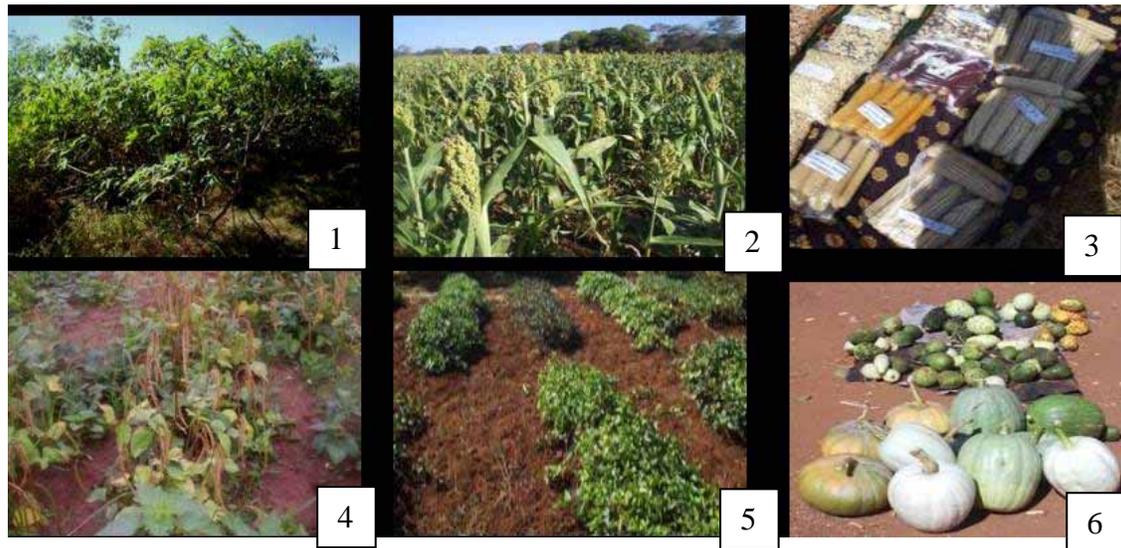
Table 2: Some cultivated crops found in Zambia

CATEGORY	SPECIES	REMARKS
1. Indigenous Crops	Sorghum Finger millet Pearl millet Cowpea Bambara nut Sesame	Include crops (with their wild relatives) that are cultivated and occur in Zambia and those domesticated within Africa.
2. Naturalised Exotic crops	Cassava, maize, beans, pumpkin Sweet potato Beans, mango G' nuts, avocado Citrus, banana	Introduced exotic crops that have been under cultivation for a long period and have evolved adaptive variation and integrated in the local farming systems.
3. Recently Introduced Exotic crops	Soy bean, Potatoes Wheat Strawberry Apple	These are considered to be recent introductions and have evolved much local adaptive variation and not integrated into local farming systems

Source: NPGRC 1999

The majority of indigenous crops and plants in Category 1 and some in Category 2 are considered underutilized; whereas in Category 3 all species are those recently introduced in Zambia and lack significant variation within species. Note that this list is just an example of the long list of underutilized crops and plants in Zambia (*Figure 4*).

Figure 5: Crop genetic resources found in Zambia



1. Cassava. 2. Sorghum. 3. Maize. 4. Cowpea. 5. Sweet potato. 6. Cucurbits

The cultivated crops, including the semi-wild plants, the weedy and wild relatives of crops have undergone human and natural selection for local adaptation that has led to the generation of the above unique and valuable diversity that has played and continues to play an important role in agricultural production especially in the subsistence traditional farming systems which are central in sustaining household food security, alternative livelihoods, human nutrition and income generation of the Zambian majority.

Occurrence and distribution

The occurrence and distribution of underutilized species of crops and plants is widespread throughout the country, being affected by ecological adaptations –and cultural traditions and other factors. The cultivation of food crops has evolved mainly around the continued cultivation of four (4) main staple crops, namely Sorghum, millets, cassava and maize. The more drought-tolerant crops, such as sorghum and pearl millet, are traditionally cultivated in the drier southern part and low-lying areas of the country in Agro-Ecological Zone I, especially in the permanent and semi-permanent valleys of the Gwembe and the Luangwa, and the plateau areas along Choma-Kalomo/Namwala and Mazabuka, among the Tonga people and among the Kaonde of the North-Western province. There are remnant indications of sorghum cultivation in the Northern province, which are reminiscent of the more extensive traditions of its cultivation and utilization among the Bemba ethnic groups, and which later was obscured by cassava introduced from the Congo through the White Fathers Missionary activity as a campaign against famine and locusts, in particular.

Cassava and finger millets are important crops in traditional farming in the high rainfall areas of AEZ III, especially among the Bemba-speaking ethnic groups in the slash-and-burn Chitemene cultivation systems. These crops occupy a special cultural niche among the Bisa-Tabwa people of the Lake Basin areas following the Chambeshi-Bangweulu and

the Luapula-Mweru drainage systems and also the Lunda-Luvale of the Western province.

Maize is the dominant crop throughout the country occupying about 75% of the farming systems, with the bulk of it being produced in the commercial farm block along the medium-rainfall plateau belt from Livingstone to Mkushi (The maize belt) occupying most of Central regions and Eastern province plateau belts of the country, and cultivated by the majority of the ethnic groups.

Some of the underutilized species such as legumes like cowpea and the common bean, are traditionally cultivated as intercrops or in varying mixed associations with the main cereal staples that stand upright for them to climb and bear more yield than when left to grow as sole crops on the flatland. As for cucurbits, pulses and ALVs, some of them are grown as intercrops (for example, *Cucurbita maxima*), while others occupy the inferior places like the ash-fertile rubbish heaps, dumps, and other neglected areas, usually nurtured around the local homesteads. This practice is common throughout the country.

Some of the underutilized species are in various degrees of domestication or cultivation from one community to another: Traditionally cultivated crops, including semi-wild plants, weedy and wild relatives to crops, occupy special niches in various modified microenvironments and occur naturally in the rainy season. *Corchorus spp.* is a delicacy among the Nyanja-speaking peoples in the eastern part of the country, while *Amarathus spp.*, *Cleome spp.* in the semi-arid regions of AEZ I) and *Abelmochus esculentus* are part of the vegetable relish to the traditional starch staple dishes throughout the country, and therefore, form the bulk of cheap and accessible food plants rich in the sources of nutrition especially in various micronutrients of Vitamin A, B complex, C, iron and iodine and income generation, among other potential benefits, especially among the majority of the vulnerable households in rural and urban areas. Therefore, there is scope for promoting these species through policy revision and support.

There are a number of root tuber crops and semi-wild plants that also have formed part of the food chain crops over many generations and have the potential for further value-addition through preservative processing and packaging into the more storable foodstuffs: The calories-rich root tubers, such as sweet potato and cassava, are cultivated and consumed throughout the country, while the wild yams (*Discorea spp.*) are traditionally eaten by the *Tonga* people in the Southern province. The Livingstone potato (*Plectranthus esculentus*, *ground orchids (Disa and Habenaria spp.* are widely cultivated and eaten in various parts of Northern and Central provinces.

Extent of utilization

The findings of Ogle *et al.* (1990) on the utilization of African Leafy Vegetables and associated underutilized crops and plants in Zambia underscore the importance of these species in the livelihoods, food security, nutrition and health, and household incomes of the Zambian majority. For example, the findings on the proportion of ALVs as relish accompaniment to maize or cassava diets in Luapula province reveals that in the rainy season (December-April) 56%-90% of the population consume ALVs, in the cool-dry

season (May-June) 41%-65% consume them, while in the hot-dry season (August-November) 24%-61% consume them.

The relative proportion and availability of underutilized species is dependent on various factors including the preferred local ecological niches of some of these species, the seasonality graph, as well as the dominant traditions and socio-economic systems and the demographic patterns, including urbanization trends and the emergence of female-headed households (accounting for 30%-40% of same). Women are also traditionally associated with the cultivation and utilization of the bulk of the underutilized species.

There is a significant informal trade in some of the underutilized crops and plants on the roadside, and in local and urban markets, especially by women and children. Chidumayo and Siwela (1988) report that wild fruits frequently marketed are *Anisophyllea boehmii*, *Strychnos cocculoides* and *Vangueriopsis lanciflora*. In Lusaka, fruits of *Adansonia digitata*, *Azanza garckeana*, *Diospyros measpilliformis*, *Tamarindus indica*, *Ziziphus mauritiana* and *Uapaca kirkiana* are sold. There are about 46 known indigenous edible fruit species utilized in Zambia. The wild edible orchids of *Disa spp.* and *Habenaria spp.* (known as *Chikanda*, a groundnut protein-vitamin-rich delicacy (or snack) among the Bemba speakers in Northern, Luapula, Central and Copperbelt provinces and the *Plectranthus esculentus (Umumbu)* growing in ecological niches of the Central province districts of Serenje and Mkushi, are traded in the urban markets (Ng'uni & Chuba 2002).

Figure 6: Utilization of some underutilized crops and plants



Local roadside market



The rural market



Local market in Rufunsa

The bulk of medicinal properties for various uses, for example, as natural insecticide repellants, fertility regulation, foods, skin and body treatment are derived from leaves, stems, bark, roots, pods, flowers, etc of underutilized species. These are utilized based on Indigenous Knowledge Systems (IKS). *Cleome spp.* is used to cure pneumonia, boosts the immune system and the soaked fluid works as an eye ointment. The Traditional Healers and Practitioners Association of Zambia (THPAZ), with the many herbalists and plant resource users, is one such local NGO that works in this field of utilization of underutilized plants and IKS to meet the health and healing requirements among the majority of the Zambian people. Alas, much of this potential wealth of medicinal plants and the associated IKS is largely underutilized, and is neither researched nor documented.

III. PLANT GENETIC RESOURCES CONSERVATION EFFORTS

As part of national efforts towards the conservation of crop genetic diversity, in 1989 the Zambian government established the National Plant Genetic Resources Programme (NPGRP) under the Ministry of Agriculture and Cooperatives (MACo), as a counterpart to the SADC Regional Plant Genetic Resources Programme (SPGRC), with the main objective of contributing to sustainable crop production by ensuring the availability of a broad genetic base and preserving the country's crop genetic heritage and the associated traditional practices and indigenous knowledge systems.

Priority in terms of conservation has been given to indigenous and traditional crops, with special emphasis on food security crops. The National Genebank has therefore a substantial proportion of underutilized plant species accessions in the collection. Currently the National Genebank is holding about 5,500 accessions. A substantial percentage of this diversity are genetic resources of plant species considered to be underutilized. Table 3 shows accessions of underutilized plants that have been provided for use by the national genebank.

Table 3: Germplasm of underutilised plants utilized from the national gene bank

Species	User	Purpose	No. of accessions
Uapaca kirkiana (African loquats)	Agorforestry	Research	41
ALVs	Farmers	Seed multiplication	41
(Latin)Amarula	Agroforestry	Research	33
Amaranthus	Vegetable Programme	Research	30
Bambara	Breeder	Research	33
Brassica	Development	Research	13
Castor	Breeder	Research	24
Cleome	Development	Research	35
Corchorus	Development	Research	12
Cowpea	Entomologist	Research	100
Finger millet	Breeder	Research	6
Okra	Farmer, Development	Research	22
Pearl millet	Breeder	Research	17
Pumpkin	Breeder	Research	49
Sesame	Breeder	Research	22
Sesbania	Researcher	Research	6
Sorghum	Farmers, breeders, researchers	Research	166

Source: NPGRC 2006

Note that the number of accessions in the above Table 3 could be higher, (as, for example, *Cleome* and *Brassica spp.*), than the number of accessions kept at the National Genebank (see Annex C). The reason for this is that during crop seed collections, collected samples are stored in the utility section, where crop seed users are allowed to

make application for and be given seed. Once the seed is registered, it is then stored in deep freezers (Annex C list), and conserved.

The use of the conserved PGR in Zambia has centered on a few major and mainly exotic crops through public R&D. As such there is little formal research (R&D) for most of the traditional crops. Zambia's agricultural policy has promoted long-term investment in R&D programmes for the maize staple and other cash crops such as cotton, coffee and tobacco. The extension services have been tailored to support the growing of exotic crops, which have received considerable R&D attention. ANNEX 3 shows the germplasm material in the national genebank.

Some samples of sorghum and a number of underutilised yet nutrient-rich African Leafy Vegetables (ALV), such as *Amaranthus* spp., *Abelmoschus esculentus*, *Cleome gynandra*, *Brassica carinata* and *Cucurbita maxima* have been distributed in cooperation with BCN and NPGRC to smallholder farmers in Rufunsa, Katuba and Lusitu for enhancement of on-farm conservation and restoration of lost germplasm in farmers' traditional farming systems.

IV. GAPS AND CHALLENGES

In spite of the progress being made in the conservation of biodiversity in general and PGR in particular, there are still a number of gaps and challenges in terms of the policy environment at national, sectorial and institutional levels relating to the conservation and sustainable utilization of these resources, especially with regard to underutilized crops and plant species.

These gaps and challenges are reflected in the programmes and activities of public institutions such as the National Plant Genetic Resources Centre (NPGRC) under the Zambia Agriculture Research Institute (ZARI) and extension services under the Department of Agriculture. There are also a number of challenges at the farmer level stemming from traditional farming practices and improper land management.

National PGR programme

The NPGRC is mandated to implement the National Plant Genetic Resources Programme (NPGRP) with the main objective being the conservation of the locally available plant genetic resources. Activities include collection, conservation and characterization of these locally-available PGR. Although the scope is broad and includes crop and useful PGR, priority in terms of collection and conservation has been placed on major food crops such as maize, beans, sorghum, millets, cowpeas and groundnuts in line with the national policy direction of enhancing food security. Since most of the collection missions have been multi-crop, a number of germplasm of some underutilized crops and plants have also been collected and conserved by the NPGRC. Factors that contribute to current gaps in the collection and conservation of underutilized crops and plants include limitations in terms of technical capacity, relating to handling of the genetic resources of some these plant species. The existing capacity of the NPGRC in terms of conservation is limited to handling orthodox seeds. Crops that are normally vegetatively propagated (this includes both major and minor root and tuber species) are not fully represented in the

NPGRC collections, mainly due to lack of appropriate conservation facilities. Other minor crops with similar status include the semi-wild plants and wild relatives to crops.

Unsustainable farming practices

There is a national concern that the crop and plant diversity found in farmers' fields is threatened, leading to actual loss of some of the crops especially through increased land-clearing which destroys useful plants and habitats through unsustainable agricultural practices and through the low levels of awareness, appreciation and valuing of traditional crops on the part of the Zambian majority.

High poverty levels and HIV/AIDS

The challenges of growing poverty (affecting 73% of the population) and the HIV/AIDS pandemic (afflicting 18% among the 18-49 years old) leading to severe socio-economic hardships are causing the Zambian poor majority to continue putting undue pressure on the sustainable management options for biological resources. People especially those in the rural areas are left with no options but to over-exploit the natural resources for their livelihoods and to meet other socio-economic needs. This situation has to some extent contributed to a renewal of interest in a range of underutilized crops and plants that are appreciated as being important from the nutritional point of view and, thus, in mitigating the effects of HIV/AIDS and malnutrition in general.

Inadequate institutional capacity

These include lack of intra and inter-sectorial institutional arrangements and coordination mechanisms for effective integration and implementation of policies and laws, especially the ones that are closely related, such as those of agriculture, forestry, lands and natural resources. Apart from some level of improvements in the Forestry Policy (1998) and Forestry Bill (1999) which incorporate aspects of Joint-Forestry Management, there is little legal provision for involvement of local communities and Indigenous Knowledge Systems in the implementation and enforcement of related legal frameworks. Several government departments or units in the Ministry of Agriculture and Cooperatives (MACo) lack the institutional resources to deal effectively with the multi-sectorial PGR issues, and environment activities have always been under-funded or not funded at all. For example, the Transitional National Development Plan (2005) had less than 2% of the total government budget for Agriculture; despite the Southern African Development Countries (SADC) government commitment in Maputo and Dar-es-Salaam which endorsed that 10% of annual government expenditure must be dedicated to agriculture.

Since the 1980s, various environmental policy documents including the National Conservation Strategy (1985), National Environmental Action Plan (NEAP, 1994) and the Biodiversity Strategy and Action Plan (BSAP, 1999) have advocated the inter-sectorial coordination, and the review and harmonization (of the various natural resources/environmental policies with the objective of overcoming the institutional limitations within individual institutions.

V. POLICY ENVIRONMENT

Agriculture

During the pre- and most of the post-independence era (after 1964), the key agricultural policy measures were centered on the promotion of maize production as a staple food and the market or export-driven cash crops, such as tobacco and cotton. Following independence (1964), the agricultural policy supported the commercial production of maize on large-scale estate farms and among small-scale farmers through facilitation of extension services, credit, markets, transport for inputs and the collection of produce.

This policy was carried out through parastatal companies such as the National Agricultural Marketing Board (NAMBoard) and the Zambia Cooperative Federation (ZCF), and thereafter through LIMA Bank and CUSA or Credit Unions (1980-1994), as reflected in the guaranteed producer (Pan Territorial & Pan Seasonal) prices for maize (since 1974/1975) and cash crops (such as soybean and sunflower) over several decades (Kumar 1994), to the disadvantage of a broad range of minor and neglected crops. From 1994 to 1997 the government experimented with Private Sector Credit Managers who proved unsuccessful, after which the Food Reserve Agency (FRA 1998) was hired.

Prior to 1995, specific National Agricultural Policies (NAP) were virtually non-existent. The Agricultural Sector Investment Programme (ASIP 1995) became a policy guideline which emphasized, among other elements, maintenance of the agricultural resource base, and the application of sustainable conservation farming methods and crop diversification - especially towards the utilization of ecologically-adapted crops and plants in Zambia - thus, obviously promoting the bulk of underutilized species, although these were not specifically mentioned.

The agricultural policy of 2004 acknowledges the importance of underutilized plants through the food security objective, which states the need to promote the production of diversified crop species, including cereals, legumes, roots and tubers. The other objective stresses the need to increase and diversify agricultural exports, including those derived from minor crops, such as essential oils, species and vegetables. In terms of enhancing crop production, the agriculture policy provides diversification and maintenance of agro-biodiversity as some of its key strategies. This includes the need to develop measures to conserve and utilize locally-available agro-biodiversity. Both the R&D and Extension institutions under the Ministry of Agriculture and Cooperatives (MACo) have policy objectives that promote crop diversification.

Over the past 5 years or so, the Government has been engaged in the process of developing a new agricultural policy, the overall objective of which is to facilitate and support the development of a sustainable and competitive agricultural sector that assures food security at both national and household level and maximizes the sector's contribution to the gross domestic product (GDP).

The following are the priority policy objectives:

- i) To ensure national and household food security through the all-year round production and post-harvest management of adequate supplies of basic foodstuffs at competitive costs
- ii) To contribute to sustainable industrial development by providing locally produced agro-based raw materials
- iii) To increase agricultural exports, thereby enhancing the sector's contribution to the national balance of payments
- iv) To generate income and employment through increased agriculture production and productivity
- v) To ensure that the existing agricultural base is maintained and improved upon

Under the food security objective maize, sorghum, millet, cassava, sweet potato, beans and groundnuts are some of the crops targeted. Apart from the food production focus, policy emphasis is also on food processing, promoting utilisation, food crop storage and preservation, nutrition and food safety.

Although the current agricultural policy alludes to the strategy of crop diversification, it does not go far enough to specifically mention the need to promote underutilised crops.

Social issues

Indigenous Knowledge (IKS) is local traditional knowledge generated by people living generally in small or particular communities, tribal or ethnic groupings or clans, and also extended families, and is passed on from one generation to the next. Being largely oral, IK gets into the thin layers as people move from the rural to the urban, from the settled life to the nomadic one, and from being original inhabitants to migrants or cosmopolitan life styles. (Ecosystem vs. Biosphere People, Gupta 1994). In other words, as local people and communities leave their socio-cultural roots – for example, through the urbanization process or the western school model (described above) - they move towards loss of IK; and for the subsequent generations they are even further removed, and hence the need for mainstreaming IK in the school curriculum.

Education

Historically, the Zambian education system and education policy, inherited from the British colonial system, followed the Western model of education which disregarded indigenous knowledge and socio-cultural systems such as the use and knowledge of indigenous plants in initiation ceremonies and rituals, calling them 'primitive' and 'inferior' in the circular context or as 'sorcery' and 'pagan' in Christian circles, and instead promoted the school curriculum of Western concepts and methods.

Even with the *UNESCO* Literacy Campaign Programme and, later, the Functional Literacy Programme (in 1960s-1970s), the system could not overcome high illiteracy affecting more than two-thirds of the population. The 2002 Free Primary Policy for All (by 2015) has still to rehabilitate between 800,000 and 1,000,000 children of school-going age (as of 2005) who are still outside the school curriculum. The few Africans who were (and are) considered 'educated' ('civilised') fulfilled the curriculum to the end and work (or 'function') in a society where the economic system is led by the minority elite; they have also adopted the Western food culture based on the narrow range of market crops – at the expense of, and the marginalization of, the broad range of local plants and crops.

The informal education and public awareness (EPA) activities promoted through the extra-curricular Chongololo clubs (1975-1995) alongside the Zambia Basic Education Curriculum (ZBEC, after 1980), has declined in recent years. The latter also included an Environmental Science Syllabus to enhance both the young and adult population's understanding of and work with conservation of crops/plants and animals.

The National Environment Action Plan (NEAP, 1994) does emphasize the role of Environment Education (EE) through the development and mainstreaming of the comprehensive Environment Education Plan (EEP) aimed at the primary, secondary and tertiary institutions, as well as through civil society at large - for example, by the Environment Council of Zambia (ECZ), Zambia Wildlife Authority (ZAWA); non-governmental organizations (NGOs) such as the Wildlife Conservation Society of Zambia (WCSZ), Biodiversity Community Network (BCN), the Zambia National Farmers Union (ZNFU) and the private sector, such as the Zambia Seed Trade Association (ZaSTA).

The National Education Policy of 1996 also addresses environmental health - for the pupils and the communities from which they come. The policy recognizes that good pupil, community and societal health are dependent on a healthy environment. In addressing issues related to this, the Ministry of Education will strive to cooperate with the Ministry of Environment, Community Development, Agriculture, and others, in the improvement of nutritional status and other health-related matters. The policy does not address school feeding programmes.

The NEAP (1994) points out that formal education must integrate traditional education, knowledge and approaches with the modern education systems/values in the school curriculum as recommended by the Department of Culture (2006) of the Ministry of Community Development and Social Services (MCDSS). Due to lack of promotion of EE approaches (or holistic learning) by facilitating both the young and adult population to acquire basic knowledge and interaction with the environment – including the physical, cultural and man-made environment and the Genetic Resources (GRs) - in many walks of life there is a divide between the 'educated' and 'uneducated', and the 'urban' and 'rural', and this dualistic way of thinking started the change in food cultures between the 'elites' exotic food' associated with the successful people and the 'villagers' traditional food' linked to the unsuccessful people.

Health

The National Nutrition Policy, which was developed in 2006 under the Ministry of Health, recognizes the fact that food entitlement for most rural households is linked to agriculture. The policy states that production of minor staple food crops has been fluctuating at a low level, leading to increased vulnerability to food insecurity, especially among the rural population. Policy measures indicated include the need to promote increased food diversification, production and consumption, and the utilization of all available food resources for the improvement of nutrition status. Although no specific measure of underutilized plants is indicated, it is clear that the policy does include these species in its objectives, which aim at addressing the current nutritional problems or issues.

Government signed their endorsement to the 'Alleviation of All Forms of Hunger and Malnutrition' at the International Conference on Nutrition (ICN 1992) through the adoption of the World Declaration and Plan of Action for Nutrition. Despite such a commitment, Zambia still has acute micro malnutrition problems. Vitamin 'A', iron and iodine deficiencies are prevalent and are considered a public health problem. The national survey (1997) indicates that 65.7% and 21.5% of children and women, respectively, had ≤ 20 mg/dl serum retinal levels; and 6.2% and 11.6% of children and women, respectively, experienced night blindness - placing Zambia in severe clinical and sub-clinical Vitamin 'A' deficiency according to the WHO population-affected cut-off points. Similarly, iron deficiency affects 65% of the children, and 42% of women in the reproductive age group are anaemic with a higher proportion of affected children in rural areas (72.4%) compared to urban areas (56%)(National Survey 1998).

Macro malnutrition is similarly high: Protein-Energy Malnutrition (PEM), observed as stunting, underweight and wasting in children under 5 years old, were 39%-53%, 22%-27% and 5%-7%, respectively. Owing to the high poverty (hunger) levels and in particular the prevalence of malnutrition in the country, food fortification was identified as one of the important strategies to combat both macro and micro-nutrient malnutrition. This includes:

1. High-dose Vitamin 'A' supplement to children (6-72 months) during the National Immunization Days and to recuperating mothers within 4 weeks after giving birth.
2. High-dose Vitamin 'A' supplement to children being treated for measles, PEM, diarrhea and respiratory infections, to adults with prolonged diarrhea, and to HIV/AIDS patients.
3. Iron and folic acid/folate supplement to pregnant women attending antenatal clinic and often to lactating mothers as prophylaxis and for anemia treatment.
4. Iodine (capsule of iodized oil) supplement in the severe Iodine Deficiency Disorder (IDD) areas, such as Gwembe valley.
5. Salt iodation on small scale and for all imported salt.
6. Fortification of margarine with vitamin A and D.

7. Fortification of High Energy Protein Supplement (HEPS) with vitamins and minerals produced for World Food Programme (WFP), for distribution in Zambia.
8. Sugar fortification with Vitamin 'A' at a large industrial level, starting May 1998.
9. Dietary diversification by production, processing, preservation and use of identified foods, including the promotion of Vitamin 'A'- rich palm oil in Luapula valley, starting in 1991.
10. Promotion of exclusive breastfeeding to infants up to 16 months old and complementary feeding alongside breastfeeding up to 24 months.
11. Nutrition information dissemination through the national radio and community radio programmes, drama, school plays and community discussions.

Social change

Historically, beginning with the colonial era (1900) and the building of Copper mining, as well as the Northern Rhodesia Railway, among other urban developments in industry and commerce, Zambia has been the land of social and economic change: Zambia is ranked as the third urbanized country in Sub-Saharan Africa (NEAP 1994). The transition from 'rural cultures' to 'urban/affluent cultures' - in other words, movement from the 'agrarian-based economy' to the 'liberalized monetary economy' following, for example, the IMF/World Bank Structural Adjustment Policies (SAP) in the late 1980s - has accelerated the pace of social and economic change: For example, the market-place selects those few crops that are economically viable, to the disadvantage/neglect of the diversity of crops considered 'inferior' and less economically-preferable. Market liberalization has accelerated the pace of over-exploitation of those plants with high economic value, leading to the extinction of some of the species, especially those whose harvesting involves uprooting the whole plant - for example, the edible root tubers including the ground orchids such as *Disa spp*, *Habenaria spp.*, *Satyrium spp.* and the Livingstone potato (*Plectranthus esculentus*).

In recent years, national discussions focus on poverty reduction (Poverty Reduction Strategy Paper/PRSP 2000-2005) and improving household nutrition (especially in the face of combating HIV/AIDs), and the pendulum is turning towards the utilization of rich sources of underutilized plants: Apart from the 100 cultivated/semi-cultivated crops and plants, more than 30 mushrooms, 60 herbs, 220 woody plants and over 150 African Leafy Vegetables are food sources rich in protein, energy and a range of vitamins, and apart from being the means of income generation, they are critical in famine (drought) periods. Mushrooms are sold on roadsides, in local and urban markets with prices ranging from US\$ 1.50 per fresh heap to US\$ 14.50 per medium-sized basket. Anecdotal information shows that over 90% of rural households harvest semi-wild and wild food plants with a gross output of 31 kg per household (per day), with the figure varying considerably according to seasonal availability and from one region or community to another.

Macro policy

On the macroeconomic level, the rising domestic production costs due to the declining copper-based export economy (1975), and the Araboil hikes (1978) and the general global recession in the same period prompted Zambia to shift its development policy and focus from copper mining towards economic diversification through agriculture (which

accounts for 18% GDP), manufacturing (25.9%) and services (48.9%). However, both the Five-Year National Development Plans (NDPs 1, 2, 3 & 4, 1966-1991) and the World Bank Integrated Rural Development Programme (IRDP) promoting growth poles in selected urban centres to spur overall national development failed to achieve this agricultural shift. For example, efforts towards implementation of the National Agricultural Policy (NAP) after the IMF/World Bank Structural Adjustment Programme (SAP) in the 1980s and 1990s plummeted due to overemphasis on social expenditure cutbacks including government extension services, cooperatives, input distribution and marketing of farm produce, R&D and farmer training, which were key to strengthening the farmer capacity!

Indeed for many years, these government plan and programmes (IRDP) did emphasize Rural and Agrarian reforms through the way of agriculture and the cooperative movement, by intensifying the levels of crop production. However, there was more emphasis on the maize staple and the market value or cash-earning crops, thus neglecting the ‘minor crops’ or the so-called underutilized species

The failure to diversify the economy towards agriculture, especially strengthening that of the majority of the small-scale farmers and the crop diversity they hold, has had a number of negative impacts: Poverty levels affecting the population rose from 50% in the 1970s to 73% (1990), while child malnutrition in its various forms reached, by average, 50% in stunting, Vitamin ‘A’ deficiencies etc. of the population at the turn into the new millennium. With the government struggling on many fronts, for example, facilitating the *2002 Free Primary Education for All (FPE 2015)* and promoting *National Health Reforms (since 1990s)*, among other pressing issues, diverted government attention from strengthening the agricultural sector – which was receiving less than 2% of the national budget. Owing to this neglect, the needs of the majority of small-scale farmers and the PGR diversity they hold, fell through the cracks and were marginalized until recently.

The promotion of national Research and Development (R&D), especially with respect to crop improvement and rural extension services, the bias has always been towards producing market-oriented cash crops. Crops that have received some level of attention could be maize, tobacco, cotton, sunflower, and some others. The foregoing will have got some form of credit facilitation through their promoters – for example, maize production through the Zambia Cooperative Federation (ZCF) and the National Agricultural Marketing Board (NAMBoard); tobacco production through the Tobacco Board of Zambia (TBZ), and cotton *via* LOHNRO Cotton, etc. These R&D arrangements give, and in some cases still receive, via working with a limited number of emergent small-scale farmers on a limited scale, some credit facilitation through the concerned companies that promote them, for example LOHNRO Cotton or through companies arranging with the banks such as the Zambia National Commercial Bank (ZNCB), CUSA Zambia, LIMA Bank and Credit Unions, among others.

In recent years, another government-driven arrangement, that came into being following the decline of the national subsidizing element (the copper-export economy) after 1974, is the *Fertilizer Support Program (FSP)* and *Food Security Program (FSP)* administered

mainly through the Food Reserve Agency (FRA), the Program Against Malnutrition (PAM) and the Ministry of Community Development and Social Services (MCDSS). It is important to note that of the recorded 800,000 small-scale farmers, only some 250,000 receive this small-scale support. Consequently, the majority of small-scale farmers in rural areas are still not receiving the required credit facilities.

VI. INSTITUTIONAL AND LEGAL FRAMEWORK

In the bid to achieve sustainable socio-economic development Zambia embarked on the process of putting in place sound environmental and natural resources management policies and strategies. This commitment is evidenced by a number of policies, institutions and legislative frameworks that the country has put in place over the years. The country has some nine pieces of legislative instruments that address biodiversity conservation and environmental protection. The issue of conservation and sustainable utilization of PGR of which the underutilised crops and plants are an integral part, is a cross-sectoral one: Unfortunately, *orthodox* practice of conserving and utilizing crops and useful plants is through the specific sectors in line ministries, departments, policy and legal frameworks.

There are approximately 9 ministries and departments dealing directly or indirectly with the issue of PGR conservation, and the majority have to do with policies and laws that regulate specific components of PGR issues including (1) Environment and Natural Resources, (2) Agriculture, (3) Forestry, (4) Wildlife, (5) Land Resettlements, (6) Town and Country Planning, and (7) Municipal and District Councils, among others.

Ministry of Tourism, Environment and Natural Resources

Biodiversity in Zambia is managed according to respective sectors in ministries and departments, for example, in forestry, agriculture, wildlife etc. However, the Ministry of Tourism, Environment and Natural Resources (MTENR) has the overall responsibility for the environment and biodiversity conservation in the country including co-ordination, formulation and review of relevant policy and also the co-ordination of its implementation among the different key stakeholders in government, NGOs, the private sector, communities and R&D institutions.

The fragmentation of policies leads to conflict of interest, overlaps and duplication of effort in the biodiversity and PGR sector. This situation led the government, through MTENR, to try to harmonize the various sector policies and pieces of legislation by the development of the *National Environmental Policy* (NEP 2005). The *first draft NEP* has already been prepared in close consultation with various stakeholders including local communities, in the bid to develop a policy with wider acceptability. The general policy direction of the country with regard to biodiversity is towards the development of an integrated approach for conservation, sustainable use, equitable Access and Benefit Sharing (ABS) of biodiversity.

The new *Forestry Policy* (1998) is a review of the old *1969 Forestry Policy* (GRZ 1998). The policy aims at increasing the country's forest cover and meeting the growing local

needs for fuel wood, fodder, timber and minor forest products. It also advocates for participatory Joint Forest Management (JFM) in which the local communities collaborate with the government and the private sector in the protection, management and utilization of forests and wild plant species. However, the new policy still operates under the old *Forest Act of 1973* because the new *Forest Act of 1999* that provides for the establishment of the *Forestry Commission* and the JFM has not yet been enacted by parliament. This makes the operationalization of JFM difficult as it has no legal backing.

Ministry of Agriculture and Cooperatives

MACo, through the *Agricultural Lands Act Cap 292 of 1960* and its departments such as the Zambia Agriculture Research Institute (ZARI) and the National Agricultural Extension Service (NAES), resumed as the Department of Field Services (DFS), focuses on farmers in 9 provinces, 72 districts, 327 agricultural farm blocks and 1,591 camps, with 1,627 field extension staff. This institutional line has had its limitations including the *major agricultural policy focus* on the promotion of the maize staple and market (export) oriented crops, such as tobacco and cotton, until recently; and underutilization of both the human and infrastructural resources on a limited T and V system. The Department of Research and Specialist Services (DRSS) has 31 agricultural research stations with trial sites in some parts of the country, but these require financial and technical support.

Membership of regional networks

Zambia subscribes to the following networks: Soil Fertility Network (SOIL FERT NET) for maize-based cropping systems in Southern Africa; the Tropical Soil Biology and fertility African Network (TSBF-AfNet); the Alley Farming Network for Tropical Africa. (AFNETA), the Rhizobium Ecology Network for East and Southern Africa (RENEASA); the International Board for Soil Research Management (IBSRAM); the Soil and Plant Analytical Laboratories Network of Africa (SPALINA); the Agro-forestry Research Network for East and Central Africa (AFRENA); Network on Management of Degraded Soils in East and Southern Africa (MADS-SEA); and the Africa Association for Biological Nitrogen Fixation (AABNF), among others. The importance of maintaining integrated systems for on-farm conservation of soil and moisture, and the cultivation of a broad range of underutilized crops and plant species, are among the priority areas, through the collaborative efforts of the foregoing networks.

Non governmental organizations

Although there are many NGOs and they do make a strong contribution to policy statements about the need to conserve and sustain biodiversity and PGR in support of food security, livelihoods, nutrition, health and income generation for the Zambian majority, very few NGOs have explicit projects or activities related to biodiversity and PGR management. The focus of the fieldwork remains very much *specific crop production oriented* (e.g. maize, groundnut, beans, cassava, etc). Very few attempts are being made to conserve the resource base in terms of the build up of soil and moisture fertility in support of *traditional farming systems and crop diversification*, other than some efforts to reinforce primary works (e.g. Contours & Vertiver strips) and some agro-forestry. Notable NGOs involved in conservation agriculture include World Vision

International (WVI), the Lutheran World Foundation (LWF), CARE, BCN, Danish MS and the German Development Service (DED).

The private sector

LONRHO Cotton has a strong interest in minimum tillage and runs an agricultural extension and credit system among 55 000 smallholder farmers. Zambia National Farmers' Union (ZNFU) through its Conservation Farming Unit (CFU) promotes conservation by minimum tillage, water harvesting, pot-holing and contour layouts. It has 1700 members of which 350 are large-scale farmers. The Golden Valley Agriculture Research Trust (GART) promotes conservation tillage and crop rotation as integral parts of a farming enterprise. Through these efforts there is increased interest among the few Non-Government Organizations (NGOs) to undertake seed multiplication and distribution programmes. Some NGOs (such as GART), the Program Against Malnutrition (PAM), Harvest Help and Biodiversity Community Network (BCN), among others, are also promoting a range of underutilized crops species.

VII. PROPOSALS FOR IMPROVEMENT

In Zambia, limited research work has been carried out on underutilized species - for example, by the Zambia Agriculture Research Institute (ZARI) on the Vegetable Research Programme (VRP); the University of Zambia (UNZA) School of Agriculture on Crop Improvement (Cowpea, *Amaranthus spp.* UNZA 1 and UNZA 2 varieties, bred by UNZA); the National Institute for Scientific and Industrial Research (NISIR) and the National Plant Genetic Resources Center (NPGRC) on underutilized plants, such as ground orchids *Disa spp.*, *Habenaria spp.* and *Satyrrium spp.* It is critical that such efforts be continued and expanded.

Indeed, the bulk of traditional food plants, both domesticated and semi-domesticated, have been neglected. Instead of concentrating on commercial food crops, national extension efforts including those of the government, R&D, NGOs, the private sector and communities, should be aimed at maintaining, popularising and improving the accessibility of a wide range of crops and plant species as this can do much to improve nutrition and food security. A rich flora providing a variety of snack foods located near or in the school compounds, for example, would improve the health of school children. Even as individual citizens we have a responsibility to maintain the maximum PGR diversity in our crops and food plants and use them for everyone's well being. To achieve this we need to:

Household and community levels

1. Make sure we and our families and households consume more traditional foods;
2. Discard the false, unwarranted notion that traditional foods are inferior;
3. Take the initiative to grow those species that we can grow and manage others in the wild, while preserving their habitats and ecosystems, even in our own back yards;

4. Promote and keep alive the IKS on crops and edible plants, local names, methods of cultivation, harvesting, preparation etc, and pass IKS on to future generations and document it. *Zambia Basic Education Curriculum (ZBEC)* would be an added advantage
5. There is need to promote marketing, processing and packaging of the bulk of the underutilized species as adding value.

Government and policy levels

1. Harmonize policies governing PGR across various sectors with a view to maximizing their contribution to the socio-economic well being of the people.
2. Create awareness at all levels on the socio-economic value of local PGR in order to promote sustainable use.
3. Develop guidelines on the data collection to facilitate monitoring the utilization of available PGR. This can be done by capacitating certain institutions and promoting collaboration among such institutions.
4. Lobby government to take deliberate measures to develop or update sectorial and institutional policies in agriculture, education, health and community development sectors aimed at promoting the utilisation of underutilized plant species.
5. Identify rare and endangered cultivars or varieties and liaise with the national genebank (NPGRC) at Mt Makulu (Chilanga) and SPGRC at Chalimbana, among other relevant institutions.
6. Systematically characterize and document the local PGR diversity in underutilized species.
7. Consider enhancing the economic value of products from such PGR through the recognition and application of intellectual protection based on *Geographic Indications*.
8. Allocate adequate financial resources raised from specific PGR for the management of those particular resources.
9. Build capacity programmes that involve participation of local communities in the conservation of PGR diversity
10. Incorporate PGR issues in the education system at all levels.

It is important to note that some of the above proposals for improvement could be undertaken through the Non-Governmental Organization (NGO) actors, particularly those concerning community-based and on-farm activities with farmer groups and organizations; other proposals in the field of processing, packaging and marketing, would be better carried out through agricultural business (Agri-Business) industries, banks and seed companies; and still other proposals in the policy arena for increased national financial and institutional support to the agricultural sector and promotion of underutilized species would be initiated through the Ministry of Finance and National Planning (MoFNP) and the Ministry of Agriculture and Cooperatives (MACo) – through the Zambian government commitment to allocating 10% of national budget expenditure to agriculture, as endorsed in the 2003 and 2004 African Union (AU, in Maputo) and Southern Africa Development Community (SADC, in Dar-es-Salaam) Declarations.

Following the relevant sectoral policies, there is room for incorporating or mainstreaming some of the suggestions of this study: for example, through the Fifth National Development Plan (FNDP 2005-2010), the National Agricultural Policy (2005-2015), the National Food and Nutrition Policy (NFNP), and the National Health Policy (NHP). It is important to highlight issues of crop diversification, balanced diets, consumption of nutritionally-adequate foods, etc. which would take on board the bulk of underutilized crop species agenda.

Table 4 illustrates some of the actors who would be involved in the implementation of the proposed proposals for improvement.

Table 4: Proposals for Improvement and Some Actors

PROPOSALS FOR IMPROVEMENT	RESPONSIBLE ACTORS
Household and community levels	
1. Education and public awareness on traditional food consumption & cultivation	-NGOs: such as BCN, ZNFU, GART, -National Food and Nutrition Commission (NFNC) -Zambia National Broadcasting Corporation (ZNBC) -Community Radio Stations (CRS) -Basic and Secondary Schools
2. Promotion of marketing, processing and packaging of underutilised species	-NGOs: such as BCN, ZNFU, GART, -Seed Companies: SEEDCo, -Agri-business: National Millers, -Local markets, supermarkets etc.
3. Relevant policy harmonization	-National Environmental Policy (NEP) Initiative -Ministry of Agriculture (MACo) -NPGRC program
4. PGR guidelines for monitoring/evaluation	-NPGRC, BCN, etc
5. Put measures in place for an increased use of underutilized crops or PGR	-MACo -ZARI
6. Identification and characterization of crops and useful plant species	-NPGRC, BCN, and others.
7. Development of some Geographical Indicators to specific crops with such potential values	-Patents and Companies Registration Office (PaCRO) -NPGRC -BCN
8. Increased financial and institutional support to issues of agriculture and underutilized species in particular	-Ministry of Finance and National Planning (MoFNP) -MACo

<p>9. Build capacity in community-based on-farm conservation and sustainable utilization programs on underutilized crops or PGR</p>	<ul style="list-style-type: none"> -NGOs: such as BCN, ZNFU, GART, -Seed Companies: SEEDCo, -Agri-business: National Millers, -Local markets, supermarkets etc.
<p>10. Education and Public Awareness (EPA) programs in the education system</p>	<ul style="list-style-type: none"> -Ministry of Education (MoE): -Curriculum Development Center -Primary and Secondary Schools -Teacher Training Colleges -Other relevant institutions

VIII. FINDINGS FROM STAKEHOLDER CONSULTATIONS

The project team had consultations on the underutilized species project with the Ministry of Agriculture and Cooperatives (MACo), the Zambia Agricultural Research Institute (ZARI), NPGRC, SPGRC, University of Zambia (UNZA) School of Agriculture; the Golden Valley Agricultural Research Trust (GART); Programme Against Malnutrition (PAM); Harvest Help; BCN; the market places in Chelstone and Mutendere and the Lusaka City market. A number of responses were obtained on the specific questions that were asked (*See Annex A*).

Questions for interviews were semi-structured and were grouped according to main themes around which further questions and discussions were generated and responses recorded. The main themes included: (1) Examples of underutilized species, (2) Reasons for the underutilization, (3) What the government must do, (4) What NGOs and private sector must do, and (5) Projects/programmes in which the respective institution is involved. that have relevance to the promotion, cultivation, processing and/or marketing of underutilized species.

Examples of underutilized crops

A good number of those interviewed mentioned that cassava (such as leaves *L. Shombo*, *B. Katapa* & root tuber), millets, sorghum, rice (for example, Mongu rice), bambara groundnuts (family of cowpea), pumpkin plant (for leaves & fruit), the Livingstone potato (the family of yams), sweet potato (root tuber *N. Kandolo*, *B. Ifyumbu* & leaves *N. Kalembula*, *B. Kalebwe*) are some of the examples of underutilized crops and plants. It was observed that the long cassava from Angola, known as *Nyasabala*, is planted widely in Senanga area in the sandy soils suitable for the long Angolan cassava but the local people prefer to cultivate the maize staple for food (Sitambuli, Personal comm. 2006). The extension worker (Sisupo, Henwood Foundation) at Mansa Agricultural Research Station observed that the reason why people are not using cassava, *Nyasabala*, was that they were no extension officers to educate the smallholder farmers, in particular, on its production and usage, and the potential for the market. In similar vein, it was observed in the lodges in Senanga and small restaurants in Rufunsa areas, that the local people tend to think that *African Leafy Vegetables* (ALVs) cannot be consumed by the urbanized (*affluent*) town people because they eat exotic foods. A South African tourist wanted to eat the vegetable from sweet potato leaves, *Kalembula*, while staying at the lodge in Lusaka, but they were not available (Stambuli, Personal comm. 2006).

During fieldwork in Senanga, an observation was made that people were planting sweet potato cuttings upright (*vertically*) thus prolonging the length of time it takes for cuttings to take root, with the result that a lot of weeds grow around the plants and they harvest low yields. For the sweet potato plant to have a higher yield the bulk of the smallholder farmers need to be educated on planting the cuttings *horizontally* because as the cuttings take root and spread quickly they overcome a lot of weeds and produce a good harvest. The Zambian *Kandolo* (sweet potato) is sweeter and better than that found in Lesotho, therefore the agricultural officers had an interest in this plant.

A number of the interviewees noted that national policy support is lacking towards the underutilized species compared to the maize staple in form of marketing: that is, buying and selling of maize; the form of farm inputs, such as fertilizer, is tailored to aid the vulnerable and yet viable smallholder farmers who cultivate maize. Out of the 700,000 smallholder farmers only some 200,000 or less are assisted annually with fertilizer, seed and credit schemes, basically through recognized institutions such as local farmer cooperatives/clubs, NGOs (such as PAM on the *Food Security Pack*) and credit agent managers. The support on R&D, *as noted many times in the background information*, is tailored dominantly to the maize staple and its associated smallholder farmers e.g. breeding different varieties of maize seed (e.g. by ZARI, ZAMSeed, PANNAR etc.)

It was also noted that the available processing industries in Zambia are oriented towards just a few crops and mostly the exotic horticultural crops - which is dictated, in part, by market demand. Most of the minor crops, therefore, could not find a market at processing and industrial levels. For the smallholder farmers who struggle to cultivate and produce the underutilized crops and plants, there are no elaborate incentives to encourage them to continue investing their limited household labour and a few hand-tool assets in the production of underutilized crops.

Underutilized crops and plants are neglected also because the science (R&D) for developing their wider cultivation, processing and usage is either virtually non-existent in Zambia or not supported within the larger PGR framework programmes (Mwala, personal comm. 2006). However, studies have been undertaken, such as the extensive research carried out on *Bambara groundnut* at Nottingham University (United Kingdom), and the fear is that if this trend continues, in the foreseeable future the *Bambara groundnut* varieties will be exported to Africa from Europe, whereas in actual fact *traditionally* and *originally* the nuts come from Africa. Some studies on the *Bambara groundnut* (which also originated in The Gambia) are also being conducted in West Africa, yet preliminary studies show that the hardiness of the *Bambara nut* and other similar underutilized species makes them more resilient to stress, but that they are very prone to pests, such as *bruchids*. The production of Bambara is socio-culturally appropriate, since Bambara can be produced at low cost and being a legume, it does not require nitrogen fertilizer. However, proper information (just as for other underutilized species) is needed to dispel the myth that *Bambara nut* causes deafness; although it is highly *flatulant* (causing gas in the stomach).

There is general consensus that there is need to allocate more government funds to agriculture (in line with *SADC Agricultural policy* that 10% of the national budget should be allocated to agricultural activities), and especially the other neglected staple crops (like sorghum, millets, cassava etc.) rather than maize alone. This will also work to avoid the maize staple deficit, which usually becomes the national outcry during the drought years, when in fact other staple crops do *comparatively* well. It was also suggested by many of the persons interviewed that government should encourage the buying and selling of the bulk of other crops - for example, stocking in the *Food Reserve Agency (FRA)* and other *agro-based industries* through various incentive structures, to increase

food security and mitigate the occasional shortfalls (an example would be to encourage the buying of cassava meal)

Need for increased awareness/knowledge on use of plants

Government and various stakeholders must raise the level of awareness and knowledge on plant usage: for example, that pumpkins are a good source of Vitamin A and they grow virtually everywhere in Zambia under minimal farm management conditions. Thus, there would be little or no need to look only for the expensive *fortified high Vitamin A Sugar* sold to the Zambian public consumers if people could be encouraged to eat pumpkins and through which they could obtain other additional micro-nutrients. Moreover, pumpkins are within the reach of the majority of poor rural populations.

Government and private sector investment is needed to discover the value of underutilized crops and plant species, just as was done *historically* for the maize staple. Inputs, such as fertilizer and seed, are tailored to aid maize farmers only; this should be extended to the bulk of underutilized species. It is also true of Research and Development (R&D). R&D support is tailored to maize farmers, for example, in the breeding of different varieties of maize seed; and there are no other minor crop varieties to give farmers a choice on which variety to plant by taking advantage of the agro-ecological characteristics and the adaptability of the crops or the varieties.

Government has implemented the crop diversification framework but there is a need to allocate resources for the implementation of this programme in order for it to take off, in the form of up-scaling of human, material and financial support. This also goes for Government investment in market research, to explore the potential of underutilized species for their processing, packaging, marketing and other forms of utilization which are beneficial and of value to the farmers, the consumers and the general public.

Programme Against Malnutrition (PAM), a local NGO, is involved in local training and input distribution to farmers, especially rural small-scale farmers, and advocacy to the private sector – for example, the Milling companies - partially or wholly, to work with and deal in market business with several underutilized crops, such as cassava, millet, sorghum and rice. PAM also acts as a link between the farmers and markets, and encourages the formation of cooperatives for targeted localities.

It is important for NGOs to engage in advocacy to all stakeholders involved, including the local communities and smallholder farmer households to improve crop diversification, cultivation and development of crops and their utilization and other potential benefits. Farmer-based Participatory Research (FPR) and integrated approaches to the ownership and utilization of benefits of underutilized species should be disseminated and capacity building facilitated across the various PGR stakeholders.

Publicity, promotion, development and management of the underutilized species must be encouraged. NGOs and the private sector should be urged to be more *pro-active* here. Investment in this sector could be better channeled through them. This could meet the needs, among others, of extensive Education and Public Awareness (EPA) on the

utilization, research (R&D), marketing and development of seed of crops and varieties regarded as minor and neglected. Advocacy in crop diversification and the development of crops and plants and their utilization are vital components.

IX. OUTCOME OF THE STUDY

Some impacts and outcomes of this study have added value in providing important planning and decision-making information to the leaders of the NGOs who have been part of stakeholder groups for interviews and literature search. For example, information on the importance of a range of underutilized species in meeting the livelihood needs of the rural and urban households in terms food security, nutrition, health and incomes, was shared and discussed among the *NGOs network workshop* (Choma, 13th-17th March 2006) including Harvest Help Sustainable Agriculture Forum (HHSAF), which involved the North Luangwa Wildlife Conservation and Community Development Programme (NLWCCDP), Keepers Zambia Foundation (KZF), the Organization for Promotion of Meaningful Development by Active Participation (OPAD), the Biodiversity Community Network (BCN), Harvest Help (HH), Participatory Ecological Land Use Management (PELUM), Kaluli Development Foundation (KDF), the Forum for Sustainable Agriculture Programme (FOSAP), and the Henwood Foundation (HF) all of which are actively working together on promoting methods for sustainable agriculture with smallholder farmers in the Western, Southern, Eastern, Central and Northern provinces of Zambia.

However, the *first* concrete outcome of the '*NGOs network workshop*' was an agreement that the concerned NGOs, with technical support from BCN, would work together in their project areas on the range of crops often classified as '*inferior crops*' but which are crucial for the crop diversification strategy advocated by the government in *NAP 2000-2010*. This is in order to improve household and national food security by mobilizing and utilizing crops such as sorghum, millets, cassava, groundnut, common bean, cowpea and indigenous African leafy vegetables (ALVs). Crop diversification, especially through the use of the bulk of underutilized crops and plants is *also* part of the NGO agenda (Mwanza & Sitambuli 2006).

The *second* institutional line, which BCN works with and has worked with on this study, is the National Plant Genetic Resources Programme (NPGRP since 1990) under the Zambia Agricultural Research Institute (ZARI) in the Ministry of Agriculture and Cooperatives (MACo). NPGRP is mandated to do, among other activities, the conservation of Plant Genetic Resources (PGR) to contribute to sustainable agricultural production by ensuring the availability of a broad range of crop and plant genetic base and to preserve the country's PGR heritage together with the traditional practices and *Indigenous Knowledge Systems* (IKS). Specifically, NPGRP collects locally available PGR crop and plant materials, maintains them in the *ex-situ* facility, characterizes and documents these germplasm materials (with *Passport data*), and often multiplies and makes them available to breeders and scientists for crop development and improvement, and carries out pilot tests on on-farm germplasm management by smallholder farmers.

Both the impact and the outcome of this study has been that of increased realization and appreciation, as well as increased participation on the part of national policy-makers in ZARI, MACo and NPGRP in the generation of information through stakeholder interviews and through their participation in the BCN and NPGRP-organized *Community Seed Fair* (in Rufunsa & Lukwipa Agricultural Camps in Chongwe district) where they have seen the need to give priority to the implementation of the *National Agricultural Policy (NAP 2000-2010)*. The main thrust of this policy is to strengthen the competitive agricultural sector's contribution to the development of the national economy through an improved *Gross National Product (GNP)*. The latter is seen as the 'engine' for national economic growth, rural development and poverty reduction, especially through the increased cultivation, processing, marketing and utilization of the underutilized crop and plant species which are in the hands of the majority of the smallholder farmers (Mwale 2006).

The *third* institutional line of influence and impact of the study is the contribution of the consortium-driven Task Force members of the Genetic Resources Policy Initiative (GRPI) including: the University of Zambia (UNZA) School of Agriculture; Programme Against Malnutrition (PAM); SADC Plant Genetic Resources Center (SPGRC); among others, of which BCN is part. All of the foregoing have contributed information and experience to this study across GRPI component activities, including Component I on *Awareness Creation on the Contribution of and Value of Local Genetic Resources and Related Local Knowledge* in Kanakantapa Resettlement and Chongwe area; in Component II on *Rights of Ownership and Control and Access to Genetic Resources for Food and Agriculture* in Nyimba and Choma-Kalomo areas, and in Component III on *Promoting the Incorporation of Traditional Varieties and Breeds in Local Production Systems*. The results of the GRPI initiative, including the information and recommendations, will also be useful to the stakeholders, including NGOs, R&D agencies and the government, as well as for NGO follow-up work, in which BCN and other NGOs and stakeholders are interested.

The *fourth* institutional line is that BCN is involved in the development of the *National Policy on the Protection and Sustainable Utilization of Genetic Resources, Indigenous Knowledge and Folklore in Zambia* (Draft 2006). This work has involved the multi-stakeholders and their contribution of scientific information and workshop reviews to the policy development process under the aegis of the *National Science and Technology Council (NSTC)* of the *Ministry of Science, Technology and Vocational Training (MSTVT)*. Some of the policy recommendations also include conservation and sustainable use of indigenous crops and plants, the bulk of which are underutilized. The important point here is that these recommendations are incorporated in the *Fifth National Development Plan (FNDP 2005-2010)* with the outcome that during the national budgeting for and implementation of this Plan, the respective government institutions (such as MACo, ZARI and NPGRP) will also implement aspects of promoting cultivation, processing, marketing and utilization of some of the underutilized crops and plants.

As a result of the above outlined institutional lines of involvement and policy thrusts, as well as various dissemination and advocacy work to be carried out, for example, by BCN, NPGRC, SPGRC, Harvest Help and the Organic Producers and Processors Association of Zambia (OPPAZ), among others, there will be a more explicit emphasis on the promotion of underutilized crops and plants in on-going projects and programmes for on-farm conservation and sustainable use of a range underutilized species in legumes, root tubers, cereals and indigenous ALVs, with the participation of smallholder farmer groups.

The above-mentioned policies, deliberately intended to engage farmers in underutilized crops and plant species, have been set up as part of the larger programme under the *National Food Security Pack (NFSP)*. BCN received literature on the *MCDSS Report on NFSP Implementation and Impact 2000-2004* and also, under the same NFSP, the guidelines for the farming season 20005-2006.

UNZA School of Agriculture is involved in research and promotion related to the Bambara groundnut. This project was started at Mount Makulu (Chilanga) and has since been taken over by the University of Zambia (UNZA). Some literature is available on pumpkin, which can be accessed at Mt Makulu, but not on all underutilized crops and varieties. Therefore, R&D needs to be carried out, especially as the underutilized semi-cultivated plants are concerned – for example, the Livingstone potato (*Plectranthus esculentus*) on which there is no literature available in the country (Mwala, personal comm. 2006)

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ANNEX A:

Discussion Guide Questions regarding the GFU Project on Analysis of National and Institutional Policies Affecting the Utilization of Underutilized Crop and Plant Species for Food and Agriculture in Zambia.

Purpose: For literature search and review, and stakeholder consultations

1. Give examples of underutilized crops and plants?
2. Give reasons why these crops and plants are underutilized?
3. What should government do to increase utilization of these species?
4. And what the civil society (NGOs) and private sector is doing?
5. Does your institution or project (even as part of a larger project) have activities on underutilized species, which we can access, and document?

ANNEX B

Institutions visited and persons interviewed

Ms. Emma Stumbuli. Agriculture Co-coordinator, Harvest Help. Kabulonga. Lusaka.

Mr. Ronald Musoni. National Coordinator, Food Security Pack. Project Manager, Programme Against Malnutrition (PAM). Rhodes Park, Lusaka

Dr. Nick Sikaenyi Mwala. Lecturer/Plant Breeder – Head of Department. School of Agricultural Sciences, University of Zambia. Lusaka

Dr. Munyinda. Lecturer/Plant Breeder. School of Agricultural Sciences. University of Zambia, Lusaka

Dr. D.S. Lungu. Lecturer/Plant Breeder. School of Agricultural Sciences. University of Zambia, Lusaka

Mr. G.P. Mwila. Senior Program Officer/Agronomist. SPGRC, Chalimbana, Lusaka

Mr. Charles Nkhoma. Director/Agronomist. SPGRC, Chalimbana, Lusaka

Ms. Anne Tembo. Chief Research Officer. Ministry of Agriculture and Cooperatives, Lusaka.

Mr. Richard Mwanza. Director. Harvest Help. Kabulonga. Lusaka.

Dr. Daura. School of Agricultural Sciences. University of Zambia. Lusaka

Mr. Dickson Ng'uni. NPGRC. Zambia Agricultural Research Institute (ZARI). Chilanga. Lusaka.

Mr. Max Mbunji. Zambia Seed Company (Zamseed). Industrial Area. Lusaka

ANNEX C

Some germplasm under *ex-situ* conservation in national genebank

Family/Genera	Latin Name	Common Name	Accession
Poaceae (Gramineae)	<i>Sorghum bicolor</i>	Sorghum	921
Poaceae (Gramineae)	<i>Eleusine coracana</i>	Finger millet	689
Fabaceae (Leguminosae)	<i>Arachis hypogea</i>	Groundnuts	447
Poaceae (Gramineae)	<i>Pennisetum glaucum</i>	Pearl millet	383
Poaceae (Gramineae)	<i>Zea mays</i>	Maize	347
Fabaceae (Leguminosae)	<i>Vigna unguiculata</i>	Cowpea	333
Fabaceae (Leguminosae)	<i>Phaseolus spp</i>	Beans	146
Fabaceae (Leguminosae)	<i>Cajanus cajan</i>	Pigeon pea	132
Malvaceae	<i>Abelmoschus esculentus</i>	Okra	122
Fabaceae (Leguminosae)	<i>Vigna subterranea</i>	Bambara nut	118
Poaceae (Gramineae)	<i>Oryza sativa</i>	Rice	111
Cucurbitaceae		Water melon	87
Cucurbitaceae	<i>Cucurbita spp</i>	Pumpkins	84
Amaranthaceae	<i>Amaranthus spp</i>	Amaranths	78
Poaceae (Gramineae)	<i>Oryza spp.</i>	Wild rice	57
Fabaceae (Leguminosae)	<i>Vigna spp</i>	Wild cowpea	53
Asteraceae (Compositae)		Sunflower	49
Pedaliaceae	<i>Sesamum indicum</i>	Sesame	47
Poaceae (Gramineae)	<i>Triticum aestivum</i>	Wheat	18
Fabaceae (Leguminosae)	<i>Sesbania sesban</i>	Sesbania	17
Malvaceae	<i>Hibiscus sabdariffa</i>	False Roselle	14
Fabaceae (Leguminosae)		Peas	14
Brassicaceae (Cruciferae)	<i>Brassica carinata</i>	Ethiopian mustard	10
Cucurbitaceae		Gourd	9
Fabaceae (Leguminosae)		Velvet beans	8
Solanaceae	<i>Solanum atheopicum</i>	African eggplant	7
Capparaceae	<i>Cleome gynandra</i>	Cleome	7
Cucurbitaceae		Cucumber	7
Cucurbitaceae		Cattle melon	6
Solanaceae	<i>Solanum spp</i>	Pepper	5
Fabaceae (Leguminosae)		Tephrosia	5
Poaceae (Gramineae)	<i>Eleusine indica</i>	Wild finger millet	5
Solanaceae		Chilli pepper	4
Poaceae (Gramineae)		Wild sorghum	4
Cucurbitaceae		Melon	3
Cucurbitaceae		Squash	3
Cucurbitaceae		Bitter gourd	2
Fabaceae (Leguminosae)		Lablab	1
Fabaceae (Leguminosae)		Lupins	1
Cucurbitaceae		Momordica	1
Caricaceae	<i>Carica papaya</i>	Pawpaw	1
Fabaceae (Leguminosae)	<i>Glycine max</i>	Soya beans	1
Poaceae (Gramineae)	<i>Pennisetum spp</i>	Wild pearl millet	1
Pedaliaceae	<i>Sesamum spp</i>	Wild sesame	1
		Total	4359

