Sida

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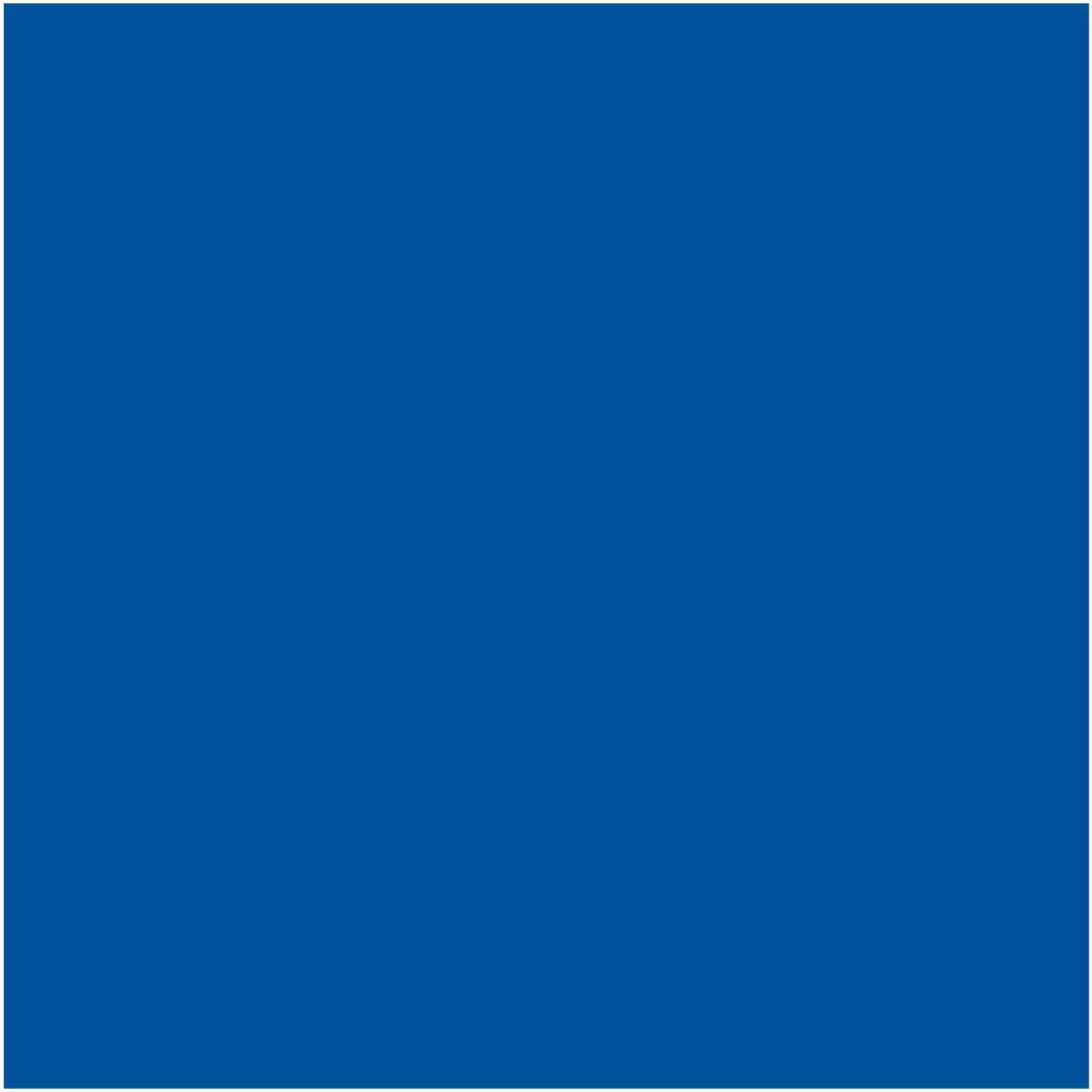
Integration of biodiversity aspects in development cooperation – a case study

Food Crop and Seed Project in Zambia



The biodiversity integration work at Sida: results from the first phase 1998–2000

In 1998, Sida initiated work on integrating biodiversity in the development cooperation. The work during the first three years (1998–2000) focused on capacity building for biodiversity integration at Sida's Department for Natural Resources and the Environment (DNRE). This was based on two main assumptions:

- There is a clear link between the internal and external components of capacity building. Experiences from mainstreaming of other issues within development cooperation (e.g. gender) has shown that an increased awareness, understanding, and pro-active work of the donor representatives (including relevant tools and policies) may substantially trigger and stimulate the interest of potential partners. A donor's biodiversity integration must therefore start "at home"
- Biodiversity issues has more immediate relevance in some areas of development cooperation than in others, and is particularly pertinent in the natural resources management sector (i.e. agriculture, forestry, fishing etc), where management choices and activities have a direct impact on biological diversity.

The first phase resulted in four main products;

- Three case studies from Sida-supported Natural Resource Management programmes: "*Crop Breeding and Agrobiodiversity: A case study on the Food Crop and Seeds Project in Zambia*", "*Capacity Building for Participatory Management of Degraded Forests in Orissa, India: A case study of the preparatory phase of the project*", and "*Biodiversity in a Diverse Programme: A case study on biodiversity-mainstreaming,from the Sida-supported Mountain Rural Development Programme (MRDP) in Northern Vietnam*". This report constitutes one of the three case studies.
- An analysis and summary of the main experiences of biodiversity integration at Sida, during the period 1998–2000: "*Integration of Biological Diversity in Sweden's International Development Cooperation – the Beginning of a Learning Process*"

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This case study has explicitly emphasised aspects of biodiversity in relation to agriculture. For this purpose, the Food Crop and Seed Project has been taken as the main focal project. Agriculture in general and plant breeding in particular utilise natural resources, and thus elements of biodiversity, for the development of agricultural technology. A certain conflict exists between the conservation of natural biodiversity in its widest sense and the utilisation of (part of) these resources for agricultural production. Within this context, the farmers, pastoralists and agronomists may be easily blamed for any possible negative side-effects of their activities on the environment and biodiversity.

In general, the issue of biodiversity is characterised by a great wideness in terms of its definition and delineation. Consequently, perceptions of the different stakeholders, users or observers may distinctly vary as far as the consequences for the management (conservation, utilisation, improvement) of biodiversity are concerned. Therefore, stakeholders' perspectives will ultimately influence management decisions. Within this context, the case study team has intensely appreciated the frankness with which all persons interviewed have shared their opinions and any available information. This has greatly contributed to the development of an image of how biodiversity and agro-biodiversity are being perceived in the agricultural sector in Zambia. As a result, it has helped in advancing the identification of constraints and opportunities and the formulation of conclusions and recommendations for the conservation, sustainable utilisation and wherever needed the improvement of genetic resources.

Thus, the authors sincerely expect that the case study will contribute to the further debate on the relationship between biodiversity and sustained agricultural development in Zambia and subsequently, to furthering Sida's process to mainstream the issue of biodiversity in all its programmes.

The authors want to generously thank, without making any distinction, all persons who have contributed to this case study in one way or the other.

Although a lot of the information has been gathered during interviews, opinions expressed in this report remain the sole responsibility of the authors.

Executive Summary

The Food Crop and Seed Project

The context for the present case study on biodiversity, part of Sida's process to mainstream biodiversity in its programmes, is the Food Crop and Seed Project (FCSP) in Zambia with a history dating back to 1981. The almost exclusive focus on maize in Zambian agriculture as the basic cereal crop, made FCSP start with the cleaning and improvement of the available maize genetic material. Later on, other crops important in traditional household food security such as sorghum, finger and pearl millet, cassava and sweet potato were also focused on. Research on vegetables and pasture crops was also carried out. Support to the project was suspended by the end of 1997 when Sida made the approval of a National Seed Policy conditional for further funding. Upon the formulation of a draft national seed policy early 1999, Sida accepted the proposal (1999–2001) for appraisal. The first component of the present proposal focuses on breeding in maize, sorghum, millets, root and tuber crops, post-harvest technology and farming systems approaches to be carried out by the Soils and Crops Research Branch (SCRB) of the Ministry of Agriculture, Food and Fisheries (MAFF). The second component focuses on capacity strengthening of the Zambia Seed Company Ltd. (ZAMSEED) in the fields of marketing, and research and development.

The Case Study

The sustainable management of biodiversity, internationally agreed upon in several conventions, is still under debate because of its complexity, dynamics and interests involved. For this purpose the case study has taken four analytical screens, i.e. perception, impact on biodiversity, roles and responsibilities, and instruments. The case study has exploited sources such as documents, websites and interviews with stakeholders for gathering information, while relevant stakeholders in Zambia have been enabled to give comments on the draft report. Because of the agricultural focus of the project, and within that an emphasis on breeding of particular crop, the case study has looked at agro-biodiversity as an important part of biodiversity. The outcome of this and two other studies (Vietnam and India), will be used by Sida as an input for the formulation of its general process towards mainstreaming biodiversity in all its programmes.

Principal findings

Perceptions

Although Sida has not explicitly mainstreamed biodiversity in its programmes in Zambia, the issue of biodiversity and related agro-biodiversity meets general interest. Depending on the perspective of the respective stakeholder, the perception on agro-biodiversity varies. Generally, stakeholders interviewed are aware of the need for genetic diversity conservation but less so for functional relationships at an agroecosystem level. Although local knowledge related to agro-biodiversity, especially of women, is assessed to be important, it is not formally documented or validated.

Impact on Biodiversity

The project has contributed to increased genetic diversity (between and within crops, between and with varieties) mostly through the importation of exotic material, and subsequently, to increased food security at household level and thus possibly to poverty alleviation. In addition, most of the improved varieties are open-pollinated having a wide genetic base (pearl millet, sorghum) and self-pollinated crops composed of mixtures of lines (finger millet) developed from local germplasm. Benefits from new varieties include high yields, disease and insect pest resistance and early maturity. The direct impact of all varieties developed and disseminated by FCSP on crop diversity and social parameters is not exactly known because of a general lack of precise monitoring data. However, the apparent fact that farmers in Zambia normally integrate a new variety into their entire seed range, would support the hypothesis that total genetic diversity in Zambia within the most important food crops might have increased. The case study has not found hard evidence of irreversible losses due to the project.

Although farmers seem to be willing to diversify their cropping pattern, they are not in a position to influence the effective market demand in the short term because of the continued high demand for maize nation-wide.

Roles and Responsibilities

Stakeholders interviewed indicate a gap between the overall responsibility of the Ministry of Environment and Natural Resources (MENR) for all issues pertaining to the environment, natural resources and consequently biodiversity, and the authority over other ministries, whereby it cannot effectively enforce policy and legislation. However, using a consultative process with relevant stakeholders at different levels, the Ministry of Environment and Natural Resources (MENR) has finalised the National Biodiversity Strategy and Action Plan (BSAP), expected to be approved by Cabinet in the second part of 1999. The six key areas of the BSAP are conservation of Zambia's ecosystems, sustainable use of biological resources, equitable sharing of benefits, conservation of genetic diversity of crops and livestock, biosafety, and the institutional and legal framework, and thus duly addresses important aspects of agro-biodiversity. Its emphasis on a five-year process of gathering more data on important biodiversity issues, in order to create a foundation for exchange among stakeholders and sound decision-making, is an asset.

It is expected that the BSAP, once approved by Cabinet and put into effect, will largely contribute to a more intensive coordination and collaboration between the relevant stakeholders at the different levels.

Within MAFF, the responsibility for biodiversity has been largely delegated to the National Plant and Genetic Resources Centre (NPGRC) because of its initial and historical focus on the conservation of genetic germplasm of local food crop varieties. The tendency among other stakeholders within MAFF and FCSP, to refer all agro-biodiversity issues to the NPGRC bears the risk that biodiversity may become a stand-alone theme which is not really integrated in policy and implementation of other departments.

In the project proposal for the next phase, research on crops with a low commercial value still remains the responsibility of SCRB, whereas the multiplication of seed can be carried out on-farm. The project has not conducted a gender impact assessment. The breeding policy does not describe specified breeding objectives in relation to farmers' requirements, gender specificity or different agro-ecological regions acknowledging possible distinctions in varietal requirements based on different perceptions on the production method or the use of the end product(s). However, the proposed integration of farming systems research into the other project components as an approach offers some scope for involving farmers in priority setting, own experimentation and evaluation, maintenance breeding, seed multiplication and dissemination.

Although seed quality is the core business of the Seed Control and Certification Institute (SCCI), it does not take a pro-active stand in advancing the issues of intellectual property rights in relation to varieties and plants and of biosafety (especially for GMOs).

The private seed sector and NGOs have taken up the responsibility of seed multiplication and distribution. The private sector is mainly involved in commercialised crops which means that for food crops, it is exclusively for hybrid maize. NGOs, coming from seed rehabilitation background after the drought years in 1991/92 and 1994/95, are mainly involved in seed multiplication and distribution of crops of less commercial interest to the private commercial seed sector. NGOs, government extension services and SCCI closely collaborate in training of community seed groups while SCCI coordinates the NGO seed and multiplication activities. A major concern is the insufficient capacity for effective maintenance breeding in Zambia which leads to inefficient use of resources and sometimes even a decrease in ultimate seed quality.

Instruments

Zambia is, apart from the binding Convention of the International Union for the Protection of New Varieties and Plants (UPOV), a signatory to all relevant international treaties. There is a considerable number of legislative documents dealing with elements of biodiversity in general and with agro-biodiversity in particular. The majority of stakeholders interviewed share the opinion that legislation in the area of biodiversity needs reviewing and adaptation to changed circumstances and that the enforcement of such legislation is not adequate yet.

Being a member of the World Trade Organisation (WTO), Zambia must have put in place the necessary structure and legislation before the

year 2000 the latest as far as plant and variety issues are concerned. The existing draft Plant Breeders' Rights Act in conjunction with the expected outcome of the task force on an all African *sui generis* system recognising rights and benefit sharing of farming communities, in the formulation of which the NPGRC is actively involved, forms a good basis for complying with this condition.

The draft National Seed Policy has met general consensus of the major relevant stakeholders but is yet to be incorporated into the overall Agriculture Policy before submission to the Cabinet. Addressing in the broad sense biodiversity, specific issues related to biosafety and intellectual property rights for varieties still need to be articulated, however, in specific legislation through the enactment of statutory instruments.

The case study has no evidence of the inclusion of an Environmental Impact Assessment (EIA) in the project formulation. Biodiversity is not explicitly considered in the project design, nor has Sida requested to do so. Therefore, no indicators for the possible impact on biodiversity have been developed nor has the impact on biodiversity been monitored. The project proposal for the next phase has not altered this situation.

Stakeholders indicate the need for the set-up of local seed reserves in order to avoid the forced replacement of local varieties through seed relief activities in disaster situations often dependent on the importation of bulk quantities of seed with a uniform character from outside the area/country.

An area of specific concern is the financial sustainability of research, public or private, in crops with a low marketing potential. It may prove to be unrealistic to acquire sufficient funding from the commercial market players. As a result of a relatively high number of commercial players in maize and strong low cash turn-overs and a trend towards the development of open pollinated varieties, efforts towards the successful commercialisation of the research and seed sector may be seriously impeded. This demands a concerted effort of the public and private sector in close collaboration with the farming community.

In Sida's guidelines for EIA, the pertinent questions on biodiversity in the checklist for agricultural projects are not elaborate with regard to the impact of interventions on the functionality of ecosystems or their components. In addition, they do not reflect the areas of international debate such as the influence of the dynamics over time or the perspective of stakeholders on the validation of biodiversity. Consequently, the impression may be easily created that biodiversity is a somewhat static parameter that can be expressed in absolute terms. This checklist does not reflect the wider perspective and challenges addressed in Sida's earlier policy document on biodiversity (Sida 1994).

Major recommendations for the project

The lessons learned and their subsequent elaboration into recommendations and suggestions for the project have been highlighted in section 5.1. Recommendations have a higher priority than suggestions and their implementation would be subject to evaluation in a next phase of the project cycle.

Below follows a selection of the major recommendations. The principal criterion for selection is the degree of possible feasibility of applica-

tion within the project, the Zambian setting or the Sida biodiversity mainstreaming process.

General:

– Because the appraisal of the next phase of the project is in a more advanced stage than the case study, it is recommended that the project holders, within the framework of the approval conditions for the next phase and in close collaboration with the donor, look for opportunities on when and how to incorporate in the coming project period important issues of agro-biodiversity which are related to the core activities of breeding and seed multiplication and distribution as indicated in the conclusions, suggestions and recommendations.

Perceptions:

– It is recommended that Sida consider funding initiatives that aim at redressing information and knowledge gaps in the field of agro-biodiversity.

Impact on Biodiversity:

– Although it is observed that Sida has never put monitoring as a condition for project funding, it is recommended that the project look into opportunities for including the monitoring of possible effects on agro-biodiversity into the project.

Roles and Responsibilities:

– Because of the widely accepted role, knowledge and involvement of women in the field of agro-biodiversity management, it is recommended that the project consider associating a more explicit gender perspective on the shortest possible term.
– In order to help Zambia adequately prepare for possible future litigations in the area of plant rights and biosafety, it is recommended that Sida consider providing support to GRZ with the establishment and strengthening of the necessary legal capacity and network.
– In order to effectively mainstream biodiversity in existing projects in Zambia, it is recommended that the donor commence a stakeholder consultative process to discuss agro-biodiversity with the relevant partner organisations. Specific activities may consist of a series of introductory workshops on the issue of (agro-)biodiversity, other policy issues (of Sida and GRZ) the inventory of information gaps, the definition of goals and activities, criteria for monitoring and evaluation, the responsibilities of the stakeholders concerned (public sector, private sector, farming community, NGOs) and the instruments to be used (e.g. legislation, monitoring, public-private partnerships).

Instruments:

– Since the BSAP offers a good basis for further elaborating issues of biodiversity relevant for Zambia, and duly recognises issues of agro-biodiversity, it is recommended that the project considers involving itself in the implementation wherever appropriate.

– In order to contribute to improved community biodiversity management, it is recommended that the project in close collaboration with the NPGRC and NGOs should consider providing technical expertise for strengthening the capacity of community groups, district level field extension staff and NGO staff in carrying out in-situ conservation of locally available genetic material, the recording and validation of local knowledge and the promotion of local genetic information centres.
– The case study recommends that the project, in close collaboration with Sida, NGOs, the farming community and the private seed companies, study the possibilities for the establishment of an adequate capacity for high quality maintenance breeding by the public sector in Zambia.
– Annex 7 proposes a possible matrix for monitoring worthwhile basic agro-biodiversity factors in agricultural projects which can be amended during the stakeholder consultative process.

Issues for Sida's Biodiversity Mainstreaming Process

Based on the finding and lessons learned for the project, the case study has identified the five issues of *knowledge base, agricultural development approach, stakeholder involvement, legal rights and benefit sharing,* and *analytical tools and guidelines* as important to be looked into in the next phase of the biodiversity mainstreaming process that Sida has embarked on.
This process can be characterised by an internal component (Sida's organisation) and an external component (programmes and projects). Considering the nature of activities performed at the various levels, different methods, techniques and tools may have to be developed and used in order to effectively integrate biodiversity in Sida's development effort at large. A first identification of such methods and tools include an internal learning trajectory, networking, adapted policy formulation, consultative stakeholder processes, joint inventories and tool development, public private partnerships, funding of relevant public biodiversity research, establishment and support of legal aid centres, donor concertation, and adaptation of EIA checklists.

Acronyms and Abbreviations

ASIP	Agriculture Sector Investment Programme
ASSP	Agricultural Sector Support Programme
BSAP	Biodiversity Strategy and Action Plan
CBD	Convention on Biological Diversity
CFU	Conservation Farming Unit
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CPRO-CGN	Centre for Plant Breeding and Reproduction Research – Centre for Genetic Resources, the Netherlands
DAC	District Agricultural Committee
DACO	District Agricultural Coordination Officer
DRSS	Department of Research and Specialist Services
ECZ	Environmental Council of Zambia
EEOA	Economic Expansion in Outlying Areas (Sida funded project)
EIA	Environmental Impact Assessment
EPPCA	Environmental Protection and Pollution Control Act
FCSP	Food Crop and Seed Project
GART	Golden Valley Agricultural Research Trust
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GMO	Genetically Modified Organism
GRZ	Government of the Republic of Zambia
IPGRI	International Plant Genetic Resource Institute
LEISA	Low-External-Input and Sustainable Agriculture
MAFF	Ministry of Agriculture, Food and Fisheries
MCTI	Ministry of Commerce, Trade and Industry
MENR	Ministry of Environment and Natural Resources
MRI	Maize Research Institute
NISIR	National Institute for Scientific and Industrial Research
NPGRC	National Plant Genetic Resources Centre

NPGRCom	National Plant Genetic Resources Committee
OPV	Open Pollinated Variety
PAM	Programme Against Malnutrition
PGR	Plant Genetic Resources
SACCAR	Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training
SADC	Southern African Development Community
SCAFE	Soil Conservation and Agroforestry Extension (Sida funded project, now called Land Management and Conservation Farming Project)
SCCI	Seed Control and Certification Institute
SCRB	Soils and Crops Research Branch
Sida	Swedish International Development Cooperation Agency
SPGRC	SADC Plant Genetic Resources Centre
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UPOV	International Union for the Protection of New Varieties and Plants
WTO	World Trade Organisation
WWF	World-wide Fund for Nature
ZAMSEED	Zambia Seed Company Ltd.
ZNFU	Zambia National Farmers Union

Chapter 1
Introduction

1.1 Mainstreaming Biodiversity

The overall goal of Swedish development cooperation is to contribute to the improvement of the standard of living of the targeted populations. This is to be achieved through the promotion of economic growth as well as an emphasis on qualitative issues such as economic and political independence in a democratic setting, social equality (gender), and sustained environmental quality. As far as the issue of a sustainable environment is concerned, the Swedish International Development Cooperation Agency (Sida) has actively promoted one of the major components, namely biodiversity, through its support to several programmes that explicitly draw attention to the importance of maintaining biodiversity as a prerequisite for sustainable development. Three areas are covered, namely national and international policy formulation, biodiversity use and conservation, and implications in natural resources programmes. Projects include, for example the completion of a country study in Uganda, the support to the Global Biodiversity Programme of the World Resources Institute and the support of the SADC Plant Genetic Resources Centre (SPGRC).

After Sweden's ratification of the Convention of Biological Diversity in December 1993, Sida has further assumed its responsibility for mainstreaming aspects of biodiversity into all programmes by subsequently formulating a process for implementation (Sida and the Convention on Biodiversity, 1994). The Department for Natural Resources and the Environment (NATUR) has been chosen as the starting point because its programmes are expected to have the most direct impact on the environment, and thus biological diversity.

In order to effectively plan this mainstreaming process, Sida has decided to carry out three case studies. One concerns the Mountain Rural Development Programme, a general development programme in Vietnam, another one is focusing on the Capacity Building for Participatory Management of Degraded Forests in Orissa (India) while material for the third and present case study stems from the Food Crop and Seed Project (FCSP) in Zambia. The case studies are supposed to provide insight into the past experiences with the issue of biodiversity as well as to indicate opportunities for mainstreaming biodiversity in the case-study programmes in particular and other Sida programmes in general.

The terms of reference for this case study, constituted of the general terms of reference for the case studies (see Annex 1) and a specific amendment for the present one (see Annex 2), define mainstreaming biodiversity as a process for "integrating biodiversity aspects; consequences for biological diversity shall be analysed and taken into consideration in all programmes and projects". Biodiversity itself is to be considered at its different levels from gene, species, population, functions and ecosystems.

The case-study team consisted of three members: an agronomist and team leader (Kees Manintveld), a plant breeder (Joyce Mulila-Mitti), and an agronomist specialised in plant genetic resources management systems (Conny Almekinders). The team leader and plant breeder were responsible for the interviews in Zambia and the basic write-up of the report. The agronomist specialised in plant genetic resources management systems provided intensive support to the write-up of the case study report especially with reference to the conceptual aspects of biodiversity. The plant breeder presented the draft report to a selected group of persons interviewed aiming at the incorporation of their feed-back into the final report.

1.2 Case-study Methodology

1.2.1 The case-study setting

The support by Sida to the Food Crop and Seed Project provisionally ended in 1997 but discussions for another phase of funding support continued. Two basic conditions for further support were the presentation of a revised project proposal as well as a Zambian national seed policy. Both documents having been produced early 1999, the Government of the Republic of Zambia (GRZ) and Sida agreed to field an appraisal mission in order to assess the project's feasibility. The two partners also agreed to combine the present case study to the appraisal mission (see amendment in Annex 2) so as to make optimal and efficient use of the relevant resource persons.

In practice, it appeared however to both the appraisal and case study team, that the issues to be covered by the appraisal did not coincide well with the specific and relevant biodiversity case study information. For example, biodiversity had not been explicitly addressed as a special theme in earlier phases of the FCSP. Therefore, only limited links between the appraisal and the case study have been actually made. Moreover, the time-frame for the case-study is longer than that of the appraisal process and considering the suspension of support to FCSP since 1997, it seems prudent to give high priority to the continuation of the appraisal process. It is recommended, therefore, that the present case-study report shall neither be presented as an appendix to the appraisal report nor that selected parts will be presented under the headline "Biodiversity" in the appraisal report.

1.2.2 Biodiversity: Conceptual background to the case

Although the issue of biodiversity attracts considerable attention in the international and national debates on the sustainable management and utilisation of the environment and related natural resources, the complexity of the concept of biodiversity is generally inadequately addressed. Consequently, activities that aim to enhance and/or support the mainte-

nance of biodiversity are difficult to design and implement.

The term biodiversity is referring to the diversity of all living organisms and their relationships; it involves plants, animals, humans, insects, bacteria, viruses and other micro-organisms. The inclusion of their functional relationships in the term biodiversity adds even an additional complexity to the term: the ecosystems. Ecosystems can be considered at different scales or levels, for example at the level of a pond, a field, a forest, a watershed, a mountain range, up to the global level. Thereby, biodiversity also is an hierarchical concept. As a consequence, biodiversity represents an immense magnitude of elements and functions and cannot be represented by a single number or function. Inventories are made of only small parts of the total of all existing organisms and just a fraction of the functions and relationships between the organisms is studied (Heywood et al 1995). Moreover, the value of the different elements composing the total diversity of life depends on one's perspective (Schiere et al, forthcoming). For example:

In the case of a general reflection on overall biodiversity, a farmer may value the crop genetic diversity as the most relevant aspect of biodiversity, a fisherman may appreciate the marine fauna, while a tour operator in Western Europe may be most interested in the variety of trees, shrubs and birds in a holiday resort.

Such differences of interest also explain differences in management and priorities in agendas. For example:

In the case of a reflection on biodiversity in a specific area which is flooded during certain periods of the year, an arable crop farmer may be interested in drainage in view of the production of a variety of soils, crops, trees and medicinal herbs, a fisherman may favour the construction of a dam to increase the diversity and quantity in fish while a pastoralist may appreciate the regular flooding in order to get a rich pasture.

For a politician with the responsibility of ensuring the national food security or the growth of the national agricultural export, local varieties may have a negative value because of their low potential yield level. In contrast, from the perspective of the conservationist or NGO aiming at maintaining genetic diversity for the use by breeders or for the future of human mankind, this rare variety may be of extreme interest.

So, since biodiversity encompasses such a tremendous field, it counts with a large number of various stakeholders whose interests in biodiversity vary accordingly. Thus, differing priorities may easily lead to conflicting interests and become barriers for the formulation of a common strategy towards the ultimate conservation and utilisation of diverse natural resources.

The importance of biodiversity is often related to sustainability, another complex concept, and a function of multiple variables (Almekinders, Struik, Joenje, forthcoming). In this concept, the time-dimension is important: in a situation of acute poverty, today's production is easily ranked higher than conservation for tomorrow's (or next generation's) requirements. The fact that biodiversity and sustainability have multiple aspects and may include different levels of system hierarchy of which the value differ with the perspective of the user (stakeholder or observer), has as a consequence that their mutual relationship involves

numerous variables. The perceptions on the relevance and functionality of biodiversity vary and are to a large extent dependent on the perspective of the users (Kieft and Buiter 1999b; Romijn 1999; Schiere et al forthcoming). Consequently, opinions on strategies and methods for the conservation and utilisation of biodiversity, including the roles and responsibilities of the different actors, also vary. While this situation is partly explained by the differences in interests that the user (stakeholder or observer), it also hints to gaps in knowledge and understanding about the actual role and relevance of biodiversity for sustainable development in general and/or for sustainable agricultural development in particular.

Because biodiversity is so all-embracing, a delineation is required for the operationalisation of particular purposes and activities. This delineation is to a large part the logical consequence of the purposes or objectives of the activity as formulated by the different stakeholders involved and in relation to the ecosystem in which the activity is to be carried out (see also Annex 7 for implications for a methodology on mainstreaming biodiversity). Thus, for example, an agricultural development project around a lake may require the definition of the maximum acceptable impact on migrating birds while satisfying production demands at the same time.

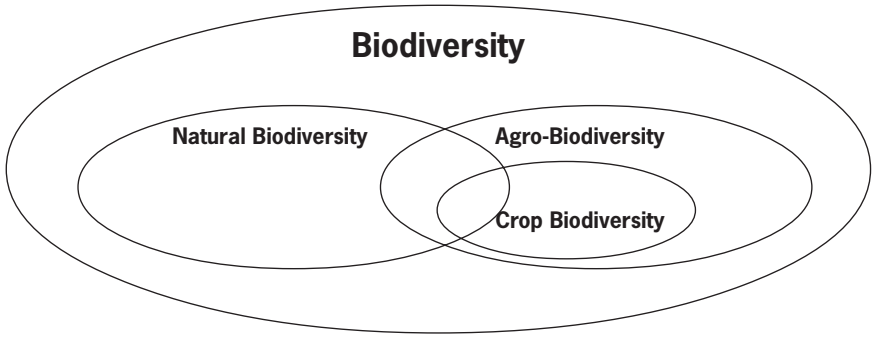
1.2.3 Agricultural biodiversity

Agriculture distinguishes itself from natural ecosystems in the importance of the factor "human intervention" and the intentional management of part of the biodiversity for production purposes. Output in biomass and the quality of the biomass are the prime indicators for the functioning of agricultural systems. Genetic diversity in crops and livestock (within and among the species with agricultural value) as well as the diversity in their interactions (e.g. protein production, nitrogen fixation, production of energy), are therefore considered the principal elements of biodiversity in agricultural systems. This biodiversity can be referred to as the "functional" or "planned" agro-biodiversity and is only a part of the total agro-biodiversity in the framework of the wider agro-ecosystem. In addition, insects, bacteria, viruses, weeds, worms and termites and other organisms interact with the crops and livestock in a direct or indirect way, and may have either a positive or negative impact on crops or livestock. The diversity among these organisms can be referred to as "associated" or "unplanned" agro-biodiversity. The total of interactions in a system form a feed back mechanism that provides the system with the capacity of self-regulation, i.e. a characteristic which many consider the basic property for a system to be sustainable.

The lines between general biodiversity, agro-biodiversity, and planned and unplanned agro-biodiversity are not clearly defined ones: interactions can relate to elements which appear to be far away from the farmers' crop, but do actually have a strong influence on the crop environment (e.g. heavy tree cutting uphill of a farm may increase runoff and threaten the diverse soil life of the same farm and thus its productivity). Figure 1 displays, in a schematic way, the domains of biodiversity, agro-biodiversity and crop diversity of which the latter is the main domain in which the FCSP is actively involved. Functional and associated diversity may occur in all the three domains.

FCSP is aiming at the improvement of food crop production in general and on breeding in particular. So, for addressing biodiversity within the context of the project, the principal focus is on agro-biodiversity, and within that framework, particularly on plant genetic resources (PGR), crop diversity, and functional diversity between the different elements at farm system level. This focus is also the focus in addressing the mainstreaming of biodiversity in this case (see also Annex 7).

Figure 1 Schematic display of biodiversity fields



1.2.4 Some issues in use and conservation of crop genetic resources

The loss of crop genetic diversity has become an issue of general concern world-wide since the success of crop breeding resulted in the replacement of landraces or local varieties. Typically, small numbers of genetically uniform crop varieties from the formal breeding programmes (partially) replaced large numbers of genetically heterogeneous local varieties. With this replacement, valuable genes have been lost and genetic variation in farmers' fields reduced. This can be explained as a negative impact on the genetic resource base and a reduced capacity of the system to genetically evolve independently of the formal system. There are, however, many different situations and subsequent ways of looking at this development. It is, again, very much a question of validation and perspective that determine whether this general impact is seen as positive or negative. In the following four of such points of discussion are presented.

First, the value of local varieties as such is a point of discussion for various reasons. These varieties are often assumed to be genetically diverse, resistant to locally important biotic and abiotic stresses and producing stable yields. Although cases have been reported about such local varieties, there is no evidence to categorically support this general assumption about characteristics of local varieties (Tripp 1996). In some cases, local varieties have also shown to possess a relatively narrow genetic base[1], are genetically degenerated, have low potential yields and are vulnerable to currently prevailing stresses.

Second, the actual value of the diversity present in these local varieties is under debate. While these varieties may have a variable appearance in the field, this phenotypic variation may not be related to valuable genetic variation. It can be based on a few genes that determine less relevant characteristics or may just be the result of within and between

[1] Especially in situations where these varieties are not really indigenous. In Africa, for example, quite some local food and fruit crops are not indigenous such as maize, cassava, sweet potato, tomato or mango.

field variation (soil, climate). Furthermore, the genetic variation between the different local varieties is often overestimated and most of the genetic variation may be present in a relatively small part of the total number of varieties in the local genepool. Therefore, it is difficult to value the genes in local varieties in general: the genes may be rare or be present in many other accessions in the world; they may code for characteristic that are now considered unimportant, but could be important in the future; they may occur in rare gene combinations or not.

Third, it is also argued that these local varieties are threatened to be contaminated by modern varieties through cross pollination. This suggests a definition of local and modern which is disputable. Many of the principal food crop species have diffused over a large part of the world and have not been domesticated in the area were they are considered to be cultivated by farmers in the form of "local" varieties. Crops and crop varieties have been introduced from elsewhere and became local through local reproduction and the consequent evolution of local adaptation (Almekinders et al 1994). Therefore, defining a modern variety or genes as "exotic" is rather arbitrary and is most of all a time-related definition: over time, adopted modern varieties will blend into the local genepool in a similar way as local varieties introduced from elsewhere.

Fourth, the fact that modern varieties are genetically uniform populations and replace genetically more heterogeneous local varieties does result in a reduction of genetic diversity in farmers fields and is an issue of variable concern; here also, some additional comments can be made. Very often modern varieties do not lead to a complete replacement of local varieties, but are added by the farmers to their actual range of varieties, and can as such, add to the crop genetic diversity. Furthermore, although being genetically uniform varieties, they often carry genes and gene combinations which are very distinct from the local materials and therefore may represent a more valuable addition to the local genepool than a local variety from a neighbouring area.

Fifth, the time element in the use of genetic diversity is also often overlooked. A frequent replacement of varieties by other ones is a form of genetic diversity which may be as valuable as a high diversity of varieties in a particular farm of area (i.e. in space) at any moment in time.

1.2.5 Stakeholders in the management of crop genetic resources

For the analysis of the management of agro-biodiversity, a model of the roles and relationships between the different stakeholders can be utilised which considers the PGR management by farmers, genebanks, breeders, seed producers as taking place in two parallel functioning systems (Figure 2). In this model, PGR management by farmers is used as a starting point. From a historical perspective, farmers can be considered the earliest crop developing actors. They were, and most farmers in developing countries still are using, developing and conserving crop genetic diversity in an integrated and dynamic way through on farm seed production and selection (Boef et al 1995; Almekinders and Louwaars 1999).

The increased scientific understanding of crop genetics in the past decades resulted in a far-reaching specialisation in crop breeding and change of the use of genetic diversity at farm level. For recombination

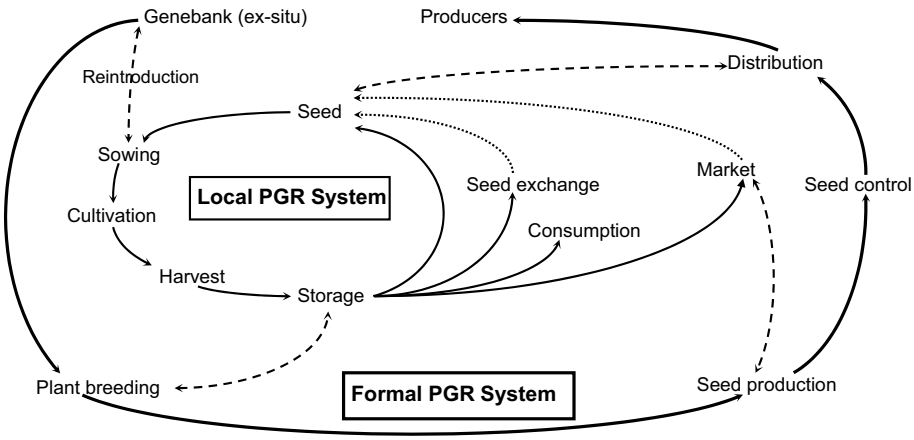
purposes, breeders needed an easy access to genetic diversity, an important reason to establish genebanks. Only later the consideration was added that these genebanks were also useful for conservation of the local genetic resources that were replaced by the successful varieties of the breeders. In general, products of breeders are multiplied and distributed by seed programmes, assisted by seed control agencies. Thus, parallel to the farmers' system of use, development and maintenance of genetic diversity (generally mentioned informal or local PGR system), a formal system – supported by research – developed. This formal system can be seen as a chain of institutions which are each responsible for a particular aspect of the PGR management.

The links between these two systems are principally formed by the collection expeditions of genebanks and the distribution of the products of the breeders through seed programmes. This development has added a series of actors to the agricultural PGR management system often referred to as seed system, as shown in Figure 2.

Because the quality of seed is crucial to crop performance, seed systems (both formal and informal) provide regulation in some form. In the informal system this regulation is based on social relations and the availability of various alternative sources of seeds. In the formal system this regulation is provided through a legislative framework. Particularly this regulatory framework of the formal system is under heated international debate. This comprises the issue of property rights (with special reference to breeders' rights, farmers' rights, traditional knowledge) and the related financial ramifications, and biosafety especially in relation to biotechnological innovations such as genetically modified organisms (GMOs).

Improved interactions between the two systems (<—> in Figure 2) could contribute to a more sustainable management of PGRs. Ways to arrive at such interaction are for example in-situ conservation, participatory plant breeding, seed banking, on farm seed production, etc.

Figure 2 Management of PGRs in agriculture by local and formal seed systems (adapted from Almekinders and Louwaars, 1999)



1.2.6 Analytical case-study screens

In order to address the above mentioned basic issues of PGR, crop diversity and the institutional framework, the case study has taken four screens (see Table 1) as reference points for collecting and analysing information about the functioning of the PGR system within the framework of FCSP.

The first screen (perception) has been taken to inventory among different (groups of) stakeholders how they personally perceive the relevance of biodiversity in relation to agriculture and what important issues are at stake. The second screen (impact on biodiversity) deals with technical aspects of PGR and crop diversity while the third and fourth screen (roles and responsibilities; instruments) cover institutional topics.

Table 1 Case-study screens

Screen	Basic issues
Perception	• What is the relevance of biodiversity in relation to sustainable (agricultural) development (e.g. functionality)? • What issues are at stake with regard to property rights and biosafety?
Impact on biodiversity	• What is exactly known about the existing state of biodiversity? • What has been the impact (of development programmes) on biodiversity? • What is the anticipated impact (of development programmes) on biodiversity in the future?
Roles and responsibilities	• What do the different actors contribute to the sound management and utilisation of biodiversity? • What do stakeholders think that other stakeholders know and do with respect to biodiversity, property rights and biosafety? • What networks are being made use of?
Instruments	• What information base does exist with regard to biodiversity, property rights and biosafety? • What policy is in place related to the management of biodiversity and issues of biosafety? • Which support and control mechanisms are practically used for enforcing policy and with what result? • What improvements are required in the area of policy and support and control mechanisms in order to deal effectively and efficiently with biodiversity management and issues on biosafety?

1.2.7 Sources of information

Information was gathered from different sources. Specific data collection instruments (see Annex 3) were prepared for use in the case study interviews. They have served as guidelines, while modifications were applied when adjustments to the situation or persons being interviewed, appeared necessary.

The material of the case study has been built upon the following sources of information:

– *Documentation material* (see the chapter on References) from:

- Sida: policy documents, programme reports, evaluation and review reports;
- GRZ and projects in Zambia during the mission in Zambia: policy documents, legislative documents, programme reports, information material;
- other sources with special reference to concepts of biodiversity related to PGR and experiences with policy formulation.
- W*ebsites* relevant for the issue of biodiversity: texts of conventions, lists of ratification and adoptions, progress of activities, concepts. See the chapter on References for a list of website addresses accessed.
- *Interviews with stakeholders in Zambia* during a two week mission in June 1999 (project staff, researchers, farmers (women and men), staff of Swedish embassy) and in Sweden (staff of Sida's Department for Natural Resources and the Environment and the consultant accompanying Sida in its mainstream process). See Annex 4 for the list of persons interviewed. The general terms of reference for the biodiversity case studies define that the latter will contribute to the formation of "the base for developing hands-on methods and guidelines on biodiversity mainstreaming for primarily Programme Officers at Sida's Department for Natural Resources and the Environment". For this reason, the present case study has emphasised the inventory of opinions of staff of FCSP, related departments as well as other relevant organisations and projects in Zambia on mainstreaming the issue of biodiversity more than those of farmers. A second step would have been to carry out a more intensive survey among different farmer groups which would reflect the different socio-economic and agro-ecological situation of Zambia in a representative way. Such a study would require, however, a more capacious timetable.
- *Electronic questionnaire among other donors in Zambia* in order to sound their commitment to biodiversity.
- *Debriefing discussion* of the first draft report with a representative group of stakeholders linked to the FCSP during a meeting in Zambia in August 1999.
- *Comments on the draft report* in written by staff of the Department of Natural Resources and the Environment as well as a number of key stakeholders in Zambia.

Considering the overall objective of the mainstreaming process, the outcome of the three case studies will be presented and discussed during a one-day workshop at Sida in December 1999 aiming at the formulation of conclusions and recommendations for the overall mainstreaming process within Sida in a later stage.

Chapter 2 Context and Background

2.1 The Socio-Economic, Agro-Ecological and Cultural Context

The agricultural sector is where the majority of the Zambian population (55%) earn their living from. The contribution to the total food production in the country is largely achieved by smallholder farmers. Women constitute 65% of the total rural population. Consequently, the majority of farm households are female headed, a common feature in Southern Africa. Estimates indicate that women strongly contribute to agricultural production, for example millet (95%), cotton (95%), sorghum (85%), groundnut (75%), maize (65%) and sunflower (55%). The agricultural sector's contribution to the gross domestic product (GDP) is 21% while 2% of the export earnings originate from agriculture (UNDP 1997).

In general, two distinct categories of farming communities can be distinguished, namely the smallholder community where sizes of cropped area range from 1 to 4 hectares and the large-scale commercial farmers (farm sizes over 60 ha). The latter constitute 1% of the farm units but account for 24% of the total agricultural GDP. A possible third group consists of the so-called "emerging" or medium-scale commercial farmers with relatively bigger farms (10–60 ha) and a higher level of mechanisation and input provision than smallholders. This category accounts for 24% of the farm units and produces 25% of the agricultural GDP (Walton 1997). The real smallholder farmers, constituting 75% of the farm units, produce 51% of the agricultural GDP.

Zambia is situated on the Central African Plateau with its altitude ranging between 1,000 and 1,600 meters above sea level. Out of the total surface of 752,614 km², an area of 42 million hectares is potentially arable land (58%). Only roughly 14% of the arable land is cropped out of which maize takes an immensely dominant share of 70%. Generally in Zambia, three different agro-ecological zones are distinguished (see Figure 3).

Figure 3 Agro-ecological zones in Zambia

Fel! Inget ämne angivet.

Source: Chisi 1997.

1 = Region 1

2 = Region 2

3 = Region 3

The major relevant criteria for the classification are the rainfall pattern, altitude and soil fertility. Region 1 receives approximately 600 mm of rainfall often poorly distributed over the year, has low fertility soils and consequently, population density is low as well (3 inhabitants/km²). Region 2 receives 800 – 1,000 mm of rainfall and generally good soils and has the highest population density (11 inhabitants/km²). Region 3 receives good amounts of rainfall over 1,000 mm per annum but soils show problems with acidity and low natural fertility. Combined with low solar energy and lower temperatures due to the relatively high altitude (900 –1,600 meter), this zone is not much appreciated for agricultural production (Chisi 1997) leading to the lowest population density of the country of only one inhabitant per km².

The typical crops for the different agro-ecological zones in Zambia are listed in Table 2 in decreasing order of potential and priority (Chalabesa et al 1999).

Table 2 Typical crops per agro-ecological zone (Source: Chalabesa et al 1999)

Type of crops	Region 1 (low rainfall)	Region 2 (medium rainfall)	Region 3 (high rainfall)
Staple crops	1. Sorghum 2. Maize 3. Pearl millet 4. Cassava	1. Maize 2. Sorghum 3. Cassava 4. Pearl millet	1. Maize 2. Cassava 3. Finger millet 4. Sorghum
Food legumes	1. Groundnut 2. Cowpea 3. Bambara nut 4. Cowpea	1. Groundnut 2. Bean 3. Bambara nut 4. Cowpea 5. Pigeon pea 6. Chick pea	1. Bean 2. Groundnut 3. Bambara nut
Cash crops	1. Cotton 2. Soybean 3. Sunflower 4. Exotic vegetables 5. Wheat 6. Rice 7. Castor	1. Soybean 2. Wheat 3. Cotton 4. Exotiv vegetables 5. Sunflower 6. Rice 7. Tobacco	1. Soybean 2. Wheat 3. Exotic vegetabels 4. Rice 5. Sunflower 6. Potato 7. Spices
Plantation crops	1. Fruits 2. Sugar cane	1. Sugar cane2 2. Fruits 3. Cashew	1. Fruits 2. Pineapple 3. Coffee 4. Sugar cane 5. Oil palm 6. Tea
Food security (household level)	1. Indigenous vegetable 2. Sweet potato	1. Sweet potato 2. Indigenous vegetable	1. Sweet potato 2. Indigenous vegetable

The variation in varieties of the different crops in Zambia is still high especially among small farmers in remote areas. Table 3 gives an overview of the number of accessions of different germplasm materials of the major food crops in Zambia available at the National Plant Genetic Resources Centre (NPGRC) and the number of food crop varieties released by the public sector in the period 1960–1998 (Mwila personal

communication; Chalabesa 1999). However, these quantitative figures do not allow to make a qualitative judgement on the variation in genetic diversity among these accessions or on the replacement of landraces.

The most recent and precise figures with regard to the impact of the project on the adoption of new varieties are found in the impact studies on maize (Howard et al 1993) and sorghum (Chisi et al 1997). Impact studies for the other crops have not been carried out in Zambia, so exact figures are not available.

The maize impact study found that the adoption of improved maize varieties among small- and medium-scale farmers was fast and high by any standard. In the period 1989 to 1991, the share of the area under improved maize increased from 52% to 58% as compared to 0% in 1983. Adoption was highest in Region 2, the typical maize zone, where this figure was over even. The hybrids MM604, MM603 and MM752 have been accounting for nearly 80% of the maize seed sold by the Zambia Seed Company Ltd. (ZAMSEED) in 1991. These hybrids have a good yield potential and wide adaptability across the different agro-ecological zones. On the average, the improved varieties produce 20–60% higher yields under smallholder conditions as compared to the traditional varieties. In general, there is tendency towards increased triple-cross hybrid production in Zambia.

The sorghum impact study revealed that 36% of the sampled area was under improved varieties. It also showed that 27% of the smallholders adopt improved sorghum varieties while these figures were 71% and 100% for medium and large scale commercial farmers respectively. The average yield increase (in grains) was 36% as compared to the landraces. The most popular varieties among smallholders are Kuyuma (68% adoption; open pollinated variety (OPV) released in 1989; early maturing white grain; good milling properties; widely adapted to low rainfall; good resistance to major diseases) and Sima (47% adoption; OPV released in 1989; medium-late maturing; dual purpose grain and fodder; well adapted to all agro-ecological regions; moderately resistant to major diseases).

Table 3 Overview of the number of available varieties in Zambia

Crop	Accessions at NPGRC	Number of varieties developed by public research (since 1960)	
		OPVs[2]	Hybrids
Amaranth		2	
Bambara groundnut	155	0	
Cassava	34	3	
Common bean	156	8	
Cowpea	401	4	
Finger millet	390	4	
Groundnut	486	10	
Maize	314	7	24
Okra		2	

[2] Open pollinated varieties but clones for cassava and sweet potato.

Pearl millet	305	6	
Rape		2	
Rice	565	10	
Sorghum	719	8	5
Soybean		11	
Sunflower		5	13
Sweet potato	95	3	
Triticale		1	
Wheat		17	

Unfortunately, the impact studies have not studied the displacement rates of landraces. Also, the above mentioned figures cannot be used as indicators for the replacement rate of landraces. It seems to be a general habit of Zambian farmers that when they adopt a new variety, they tend to keep the old landraces in their genetic range as well, at least in the case of crops propagated by seed. For example, the focus of the sorghum programme was on the breeding of short and early maturing varieties. In general, farmers welcome these varieties because they provide food early during the rainy season when the landraces, traditionally late maturing and tall in stature, are still in the field. Thus, the overall food security is increased while the long stalks of these varieties are appreciated for their diverse use as feed or construction material. The maize landraces are also preferred for better storability and pounding qualities than improved varieties. Smallholder farmers grow hybrid maize largely for sale.

In case of a vegetatively propagated crops, once a new variety has been adopted, the old variety may disappear more rapidly. This seems to be the case with traditional reddish coloured varieties of sweet potato which are rapidly being replaced by the highly performing white coloured Chingovwa variety which meets an increasing demand in Lusaka but also in Zimbabwe and Namibia. This may be partly explained by the following:

- the conservation by farmers needs deliberate planting of the crop and demands an additional effort whereas seeds of seed crops can be stored for longer periods without actually growing the crop;
- the introduction of new varieties of some crops, for example cassava, was linked to the combat of diseases and extension promoted the destruction of susceptible varieties;
- traditionally, seed crops have often been grown in varietal mixtures so as to optimally adapt the crop to rainfall patterns characterised by low total amounts and high variability; vegetatively propagated crops are normally grown in areas with more favourable rainfall patterns thus requiring less genetic variability;
- the very nature of vegetative propagation does not favour a kind of continual adaptation and revitalisation of the genetic resources base.

Agricultural output in Zambia has been declining in real terms since 1988 with the steepest decline in 1992 due to the droughts that afflicted

most of the Southern African region during the 1991/92 season and to a lesser extent again in 1994/95. The withdrawal of farming subsidies may be another factor in the serious drop in expected crop production especially for maize which has dominated the sector for a long time, and wheat and cotton.

However, despite this general decline a significant increase in area under production for food crops such as sorghum and millet (both pearl and finger millet) has been observed. When comparing the coarse grain crops maize, sorghum and millet over a period of 15 years, the share of maize in production area has decreased from roughly 95% in 1982 to 84% in 1996 (see Table 4; Chisi 1997).

Table 4 Production areas of coarse grains in Zambia (Source: Chisi et al 1997)

Season	Maize		Sorghum		Millets		Total
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)
1981/82	454,500	*95.5%*	21,450	*4.5%*	n.a.	*n.a.*	475,950
1986/87	609,529	*87.0%*	47,484	*6.8%*	43,569	*6.2%*	700,582
1991/92	661,605	*87.2%*	40,323	*5.3%*	56,557	*7.5%*	758,485
1994/95	520,165	*82.0%*	40,361	*6.4%*	73,809	*11.6%*	634,335
1995/96	675,565	*84.4%*	47,839	*6.0%*	76,930	*9.6%*	800,334

The generally perceived advantage of sorghum and millet (especially pearl millet) over maize is their lower demand for inputs because of their higher resilience to adverse production conditions such as water stress, less fertile soils (low pH, low nitrogen, low phosphorous) and pest and disease attack. However, actual yields of sorghum and millet among small farmers still remain below the yield of maize also in the drought years 1991/92 and 1994/95 (see Table 5; Chisi 1997), although available varieties can produce high yields under good management. Sorghum and millet also show disadvantages in comparison to maize, namely the higher vulnerability to bird attack. A major problem remains the lesser marketing opportunities for sorghum and millets (Sikananu 1997). In the past decades, the market channels, support mechanisms and technology have been geared towards the almost exclusive production of maize. As a result, maize still assures a more secure cash income for smallholder farmers whereas sorghum and millet continue to radiate the character of a subsistence crop more or less.

Table 5 Production and yields of coarse grains in Zambia (Source: Chisi et al 1997)

Season	Maize		Sorghum		Millets	
	Production (90 kg bags)	Yield (kg/ha)	Production (90 kg bags)	Yield (kg/ha)	Production (90 kg bags)	Yield (kg/ha)
1981/82	8,162,000	*1,616*	155,390	*652*	n.a.	*n.a.*
1986/87	11,816,095	*1,745*	291,011	*552*	336,248	*695*
1991/92	7,155,378	*973*	144,526	*323*	533,660	*849*
1994/95	8,198,271	*1,418*	295,990	*660*	606,575	*740*
1995/96	15,660,949	*2,086*	396,005	*745*	609,535	*713*

Also, the production of cassava and sweet potato has been expanding gradually among smallholder farmers particularly in the North Western, Luapula and Northern Provinces. The new variety of sweet potato (Chingovwa) is increasingly traded, even to regional markets (Zimbabwe, Namibia). This relatively recent trend towards crop diversification accompanied by a real demand from the market, is seen by all Zambian stakeholders as a welcome precautionary measure against risks of drought in agro-ecological as well as economic terms.

2.2 Agriculture Sector Investment Programme

The government policy of subsidies prior to the 1990s supported the national production of maize to the exclusion of other crops. The provision of inputs, extension services and marketing and distribution systems all favoured maize. In the 1980s, 88% of the smallholder adopters of Zambian maize hybrids used fertilisers and the rate of fertiliser application ranked second in Africa (Verma and Chibasa, undated). In addition, maize was a big cash crop (64% of smallholders sold their maize, 42% received credit while 47% were visited by extensions; Verma and Chibasa, undated). However, the 17% share (1988) of the total government budget for maize indicated that the support for the national crop was potentially unsustainable. This did not only lead to monoculture but it also affected people's taste to the extent that up to now, even in marginal areas, farmers prefer to grow maize. However, because of the high cost of fertiliser and poor rainfall, there is now a shift to crops (sorghum, millets, cassava, sweet potato) that are less demanding of nutrients and/or are seemingly more resilient to adverse conditions.

There are excellent opportunities for expansion of production of cassava and sorghum in Zambia. What is needed is the development of processing facilities to produce high value products to facilitate the creation of substantial demand for the two crops, thereby reducing the pressure on the requirement for maize.

Another new development in some high potential areas of Zambia is the emergence of outgrower schemes for cash crops. Some of the most popular crops are cotton, tobacco and paprika. In some cases, such crops have begun to replace food crops as the contracting companies supply farmers with seed and fertiliser as well provision of a ready market. In such situations, the pressure on farmers to switch to cash crops is high because due to economic hardship, they do not have much resources to grow a large number of crops and they also need the cash for their livelihood. Apart from the danger in reducing the number of crops grown, this development may lead to depletion of soil nutrients if appropriate nutrient management techniques are not applied. Moreover, a reduced food and seed security may result as well. The government needs to put in place policies for promotion of utilisation and marketing of traditional food crops.

The government's present macro-economic and agricultural sector policies appear conducive to the agricultural sector, and the Agriculture Sector Investment Programme (ASIP; Chalabesa 1999; UNDP 1997; Walton 1997) running from 1996-2001 builds on these policies. Within government's overall national development objectives, the goals and development objectives of the agricultural sector as set out in ASIP are:

- to ensure national and household food security through dependable annual production of adequate supplies of basic foodstuffs at competitive costs;
- to ensure that the existing agricultural resource base is maintained and improved upon;
- to generate income and employment to maximum feasible levels in all regions of the country through the full utilisation of local resources and realisation of domestic and export potential;
- to contribute to sustainable agro-industrial development;
- to significantly expand the sector contribution to the national balance of payments by expanding agricultural exports in line with international comparative advantage.

In order to achieve its development objectives, ASIP's main policy approaches include:

- liberalising agricultural markets;
- privatising and supporting private sector development;
- diversifying agricultural production;
- generating and dissemination of appropriate technologies;
- emphasising services to smallholders;
- implementing special actions to support food security
- improving the economic status of women;
- helping to utilise rural financial services;
- making better and more sustainable use of available land and water resources.

The expected benefits of ASIP are considered to be improved levels of sectoral performance by optimising the use of scarce government and donor resources through harmonisation of agricultural sector activities. The four complementary components of ASIP are:

Policy and Institutional Reforms

The policy reforms already initiated (liberalisation of crop marketing, removal of price controls, removal of import restrictions on farm commodities and inputs and removal of subsidies in agriculture) have given rise to crop diversification as farmers have had to adjust to crops which have a comparative advantage in their respective areas. However, it is proposed that the reforms be widened and deepened in order to create a more conducive and enabling policy environment for agricultural development. There is need to strengthen the restructured Ministry of Agriculture, Food and Fisheries (MAFF) to undertake more efficiently the formulation, coordination and management of development policies and programmes and the delivery of agricultural services. An effective decentralised coordination and management system will be established with the devolution of MAFF's commercial functions to the private sector.

Public Investment

Although many donors are involved in providing assistance to the public

sector for improved capacity to provide critical public services such as research, extension and other supporting services, delivery is still far from adequate.

Private Sector Development

Private sector development is aimed at allowing the sector to play a leading role in providing services for which it is more equipped. Such areas include procurement and distribution of inputs, provision of rural financial services, production, marketing and processing of outputs, multiplication and distribution of seeds and external trade. Although it may take some time, the private sector will be expected to be involved in providing research and extension services.

Pilot Investment Schemes

Government resource limitations will severely restrict its scope for direct agricultural sector investments in the short and medium term. These are currently limited to the Rural Investment Fund, which is part of the wider concern to ease the provision of finance, provides matching grants for communal investments.

The ASIP consists of 14 sub-programmes, namely Research, Irrigation, Fisheries, Seed Multiplication and Certification, Policy and Planning Division, Extension and Information, Animal Production and Health, Agricultural Training, Farm Power, Land Husbandry, Marketing and Trade, Rural Investment Fund, New Product Development and Standards.

2.3 Sustainable Development and Biodiversity

2.3.1 National strategy on biodiversity

The first overall attempt to explicitly conserve biodiversity was made with the elaboration of the National Conservation Strategy (1985) which was updated by the National Environmental Action Plan (NEAP) in 1994. The NEAP integrated environmental concerns into the social and economic planning process for sustainable development. Data on the dynamic development of overall Zambian biodiversity over time are scarce and fragmentary[3]. The accent in studies has been mainly on general biodiversity and less on agro-biodiversity. Comprehensive baseline data are not available while recently monitoring studies have not been conducted. The most recent country study commissioned by the Ministry of Environment and Natural Resources (MENR 1998) has rather focused on ecosystems diversity than on species diversity and had the character of a desk study. It assessed the data on crop genetic diversity to be inadequate and those on livestock as lacking.

Agro-biodiversity issues are addressed in two of the five sectoral objectives of ASIP, namely pertaining to sustainable use of natural resource base and enhancement of food security. Agro-biodiversity is also alluded to in some of the sectoral strategies outlined for achieving the five objectives. In the past, agriculture was generally considered as a threat to biodiversity, especially among nature conservation organisations. However, there is a reversing trend which indicates a growing appreciation of the contribution that increased agro-biodiversity can

[1] This feature is not uncommon even in industrialised countries where statistics are much more developed.

make to food security while simultaneously combining goals of nature conservation. However, this requires that sufficient suitable mechanisms for sustainable use and conservation be put in place such as feasible methods, facilities, qualified human resources and operational means.

With support from the IUCN, the preparation of the National Biodiversity Strategy and Action Plan (BSAP) is now at an advanced stage. The country study (MENR 1998) has served as an essential input in several stakeholder workshops at different levels leading to the production of the final draft version of the BSAP (MENR 1999). It proposes to have an initial five-year planning cycle for the formulation of a first action plan rather than hastily producing a long-term strategic plan (15–20 years) without a proper foundation (MENR 1999). The six key areas of the BSAP are conservation of Zambia's ecosystems, sustainable use of biological resources, equitable sharing of benefits, conservation of genetic diversity of crops and livestock, biosafety, and the institutional and legal framework. It is expected that the latest draft of the BSAP will be accepted by the Cabinet in August 1999[4]. Because it is an action plan, it does not need approval from Parliament. First indications show that the Global Environmental Fund (GEF) might be interested in further funding of the implementation f the BSAP.

2.3.2 Legislation

There is a considerable number (33) of legislative documents in the field of environment and natural resources which have evolved along sectoral lines. In addition, customary right based on traditional rules and practices is perceived to form an integral part of the current legislation. The Environmental Protection and Pollution Control Act (EPPCA) is the only law which has an overall focus on biodiversity conservation and management. One of the areas covered by the EPPCA is the "conservation of natural resources, including the creation of natural resources preserves for the propagation and maintenance of stocks of all indigenous species and their germplasm". Articles relate to prevention of pollution of water or air, disposal of wastes, pesticides and toxic substances, and natural resources conservation. They are indirectly linking to agro-biodiversity in the sense that certain methods of agriculture using high levels of (chemical) inputs, especially pesticides, may lead to a decreased agro-biodiversity.

Other important national legislative instruments which address the conservation and sustainable utilisation of biodiversity, also in relation to agriculture (WWF 1998, much based on work by Chinene et al 1996; MENR and IUCN 1998) are the Fisheries Act (1994), Forestry Act (1973), Lands Act (1995), Natural Resources Conservation Act (1970), Plant Pests and Diseases Act (1959), and Zambia Wildlife Act (1998).

The majority of persons consulted during the case study mentioned that effective enforcement of the existing laws is a weak spot in the system. Especially in relation to the application of international law, serious gaps seem to exist. In general, there is only limited access to relevant information on issues particularly related to Trade-Related

[4] At this moment the document is not officially approved by Cabinet yet, hence, it cannot be quoted. Within this framework, it should also be understood why IUCN did not accept to be interviewed by the case-study team on the issue of biodiversity, but referred to the Ministry of Environment and Natural Resources (MENR).

Aspects of Intellectual Property Rights TRIPS and biosafety[5]. Additionally, relatively few functional contacts with globally active (action) groups in industrialised countries which could be supportive to Zambian groups and/or organisations in specific cases, seem to exist. Information management, functional partnerships, and legal support by internationally experienced lawyers may be areas for the establishment of effective support.

Although the Patent Act regulates the grant of protection for inventions in Zambia in any field of technology, it is not distinct on plant variety protection. At this moment, Zambia does not have a Plant Breeders' Rights Act (see also Table 6, section 2.3.3). Specific written regulations on the collection, utilisation and exportation of germplasm available in the country do not exist in Zambia (Musaba 1999). The NPGRC is involved in a regional task force in writing up an all African model for a *sui generis* system for the recognition of farmers' breeding rights as well as the definition of benefit sharing. As this model deals with sensitive issues and potentially conflicting interests of different stakeholders, the draft write-up is still confidential.

Sida made the approval of a National Seed Policy conditional to the future funding of the FCSP. Section 3.3 describes in more detail the present status of the latest draft version from January 1999. It outlines the regulation of the Zambian seed industry by defining responsibilities for the public and private sector in the areas of PGR conservation, research, variety release, seed production and marketing.

2.3.3 International treaties and conventions

A large number of international treaties and conventions deal with issues related to the environment and biodiversity in general or agrobiodiversity in particular. Zambia adheres to Agenda 21 and has undertaken significant steps to implement the non-binding consensus recommendations formulated in the Rio Declaration (1992)[6]. Zambia has so far ratified all the conventions negotiated at Rio de Janeiro (Source: Statement by the Minister of Environment and Natural Resources to the 19th special session of the UN General Assembly on the review and appraisal of Agenda 21 on 07/08/97). However, Zambia does not appear to have a national focal point (Source: website UN) for the implementation of Agenda 21. Table 6 gives a schematic overview of the extent to what Zambia has adopted and/or ratified the most important international treaties and conventions relating to biodiversity issues in agriculture.

[5] A very pressing situation has arisen around the recent request by Monsanto to import Bt cotton (genetically modified cotton with insecticidal characteristics of *Bacillus thuringiensis*) with built-in protection against American, red and spiny bollworm.

[6] Agenda 21 tries to embrace the entire environment and development agenda. It is the largest product of UNCED, comprising 40 chapters and 800 pages and states goals and priorities on resource, environmental, social, legal, financial, and institutional issues. Agenda 21 is not a legally binding document but a "work plan," or "agenda for action," with a political commitment to pursue a set of goals. It may become "soft law," (Source: Parson 1992).

Table 6 Zambia and its adherence to international treaties

Treaty, Convention	Status for Zambia
Convention on Biological Diversity (CBD, 1992).	• Zambia has signed this binding convention in Rio de Janeiro on 11 June 1992 and ratified on 28 May 1993 (Source: CBD Clearing House Mechanism).
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES, 1973).	• On 24 November 1980 Zambia acceded to this binding convention. The relevant Zambian management authority is the Director of National Parks and Wildlife Service (NPWS; Source: CITES website) of the Environmental Council of Zambia (see section 2.3.4).
Convention on Wetlands (RAMSAR, 1971).	• Zambia is party to the convention on wetlands having ratified the convention on 28 December 1991. The designated administrative authority is the ECZ; Source: website RAMSAR).
FAO's International Undertaking on Plant Genetic Resources and the Global Action Plan for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture.	• Zambia is a member of the FAO Commission on Genetic Resources for Food and Agriculture, and so, adheres to the International Undertaking (Source: FAO website). • FAO, through the International Plant Genetic Resources Institute, has participated in germplasm collection missions. • FAO has provided training scholarships to the national genetic resources programme.
International Union for the Protection of New Varieties and Plants (UPOV, 1961). The Director General of World Intellectual Property Organization (WIPO) is the Secretary General of UPOV.	• Zambia is a member of the World Intellectual Property Organisation (WIPO) since 14 May 1977 (Source: WIPO website). • Zambia has not signed the binding UPOV Convention which stipulates that each Contracting Party of WIPO shall apply the provisions of this Convention, i) at the date on which it becomes bound by this Convention, to all plant genera and species to which it applies, on the said date, the provisions of the Act of 1961/1972 or the Act of 1978 and, (ii) at the latest by the expiration of a period of five years after the said date, to all plant genera and species (Source UPOV website). • A draft Plant Breeders' Rights Act was prepared in 1997 (GRZ 1997) and submitted to Cabinet but has been withdrawn in order to accommodate farmers' rights and consider latest UPOV requirements. Consensus is yet required on the issue of farmers rights' by all stakeholders to finalise the preparation of the Act.
TRIPS (1995) of the World Trade Organisation (WTO)	• Zambia is a member of the WTO since 1 January 1995 (Source: WTO website). The Ministry of Commerce and Trade is the competent administrative authority to which right holders can lodge TRIPS related applications. • Articles 65 and 66 of the TRIPS agreement define that a transitional period of five years for developing countries in order to meet all obligations ends on 1 January 2000. However, for pharmaceutical and agricultural chemicals the period may be delayed with another period of five years provided that requests for patents be filed during that period.

A crucial agro-biodiversity aspect is the issue of rights and ownership related to plant varieties. Although the protection of intellectual property rights (TRIPS) is rooted in the industrial sector dating back to the Bern Convention of 1971 and mainly linked to non-living products, it has recently expanded to living products by focusing on the patenting of plants varieties. Even if a country wants to make use of the third of the three permissible exceptions, i.e. excluding plants and animals other than micro-organisms and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes, it must provide an effective *sui generis* system of protection (TRIPS, Main features of the TRIPS agreement). Actually, the Convention on Biological Diversity takes a somewhat different stand with regard to rights and ownership of genetic resources. Although adhering to the sovereign rights of countries to manage these resources, the CBD re-

quires that parties promote international and scientific cooperation and develop methods of cooperation for the development and use of technologies, including indigenous and traditional technologies and knowledge. This implies the development of adequate regulation to be put in place for the effective implementation of the CBD. Such legislation should recognise, on the one hand, the different nature of genetic resources as compared to for example material goods, ideas or trade marks, while on the other hand, efforts put into the breeding of new varieties of organisms by organisations and/or individuals should be acknowledged as well.

2.3.4 Institutional framework

The main government players in the area of agro-biodiversity seem to be the Ministry of Environment and Natural Resources (MENR), the Environmental Council of Zambia (ECZ), MAFF, the National Plant Genetic Resources Centre (NPGRC), the Ministry of Commerce, Trade and Industry (MCTI), the University of Zambia (School of Agricultural Sciences), and the National Institute for Scientific and Industrial Research (NISIR). Furthermore, a number of NGOs is actively involved in biodiversity related issues. Last but certainly not least, the farming community especially women, plays an imminent role through the existing knowledge and actual management of biodiversity.

Ministry of Environment and Natural Resources

The MENR is responsible for coordinating, at national level, all environment related issues of which agro-biodiversity is one. After an initial flaw in the practical implementation of the non-binding recommendations of Agenda 21, a more concrete step was taken in 1997 with the achievement of the funding through the Global Environmental Fund (GEF), by taking stock of the national situation in 13 areas. The process is governed by a Steering Committee which oversees the consultations of the different stakeholders as well as the ultimate product to be submitted to the Cabinet.

The Environmental Council of Zambia (ECZ) is a statutory body under the MENR responsible for environment and natural resources. ECZ provides advice to the government and has a controlling function by overseeing the implementation of the Environmental Protection and Pollution Act of 1990. In the latter function, it monitors the execution of environmental impact assessment studies which are at present a prerequisite for all investment projects in Zambia[7], and assesses their outcome. Although ECZ, holding the secretariat of the Agricultural Lands Committee, also advises on alternative land use opportunities, its main activities are related to pollution control, information management, wildlife and general nature monitoring. ECZ is also the administrative authority for the implementation of the RAMSAR convention.

The relevant Zambian management authority for CITES is the Department of National Parks and Wildlife Service which falls under MENR. The scientific aspects are being dealt with by its Wildlife Research Division.

[7] Agricultural development projects and agricultural investment projects are also included.

The Forest Department of Forestry, falling under the MENR, is responsible for the implementation of the Forest Act which relates to issues of the protection and management of forests, licensing and sales of forest products.

Ministry of Agriculture, Food and Fisheries

The primary responsibility of MAFF is to increase agricultural productivity while basing production on a sustainable use of the available resources. The Ministry is also concerned with the need to ensure household food security, improve rural employment and raise rural incomes as a strategy for alleviating rural poverty. Thus, MAFF assigns a high priority to the conservation of biodiversity in general but more particular agro-biodiversity and has taken conservation farming as a leading principle for agricultural technology development (MAFF 1999).

The responsibility for programme coordination is being decentralised to the Provincial Agricultural Coordination Officer (PACO) while the responsibility for programme implementation is assumed by the District Agricultural Coordination Officer (DACO). The latter manages the sub-programmes and acts as the secretariat to the District Agricultural Committee (DAC) which is responsible for approving district workplans and the monitoring of their implementation. The DAC consists of district sub-programme managers, representatives of District Councils and representatives of stakeholders namely local financial institutions, NGOs, traditional rulers and farmers. In addition to a special Gender in Development Division at Cabinet Office which is responsible for the integration of gender issues in all development processes, each ministry is mandated to have its own gender desk.

National Plant Genetic Resources Centre

Recognising the essence of biodiversity in general and of PGR in particular, MAFF has created the NPGRC and reserved a special position in its organisational structure (see the organogram of MAFF in Annex 5). The NPGRC is perceived by many stakeholders as the most suitable body for the conservation of agro-biodiversity, especially the genetic aspects. The NPGRC established in 1989 forms, with other national PGR centres in the SADC, a network on PGR, and has, in that capacity, a close relationship with the regional coordinating organisation, the SADC Plant Genetic Resources Centre (SPGRC). The main elements of NPGRC's mandate are (Mwale et al 1995):

- the gathering through exploration and collecting missions carried in different ecological zones, information and materials of all indigenous and adapted exotic crops of Zambia, their wild relatives as well as useful or potentially useful wild species;
- the characterisation, evaluation, rejuvenation, multiplication and documentation of collected and stored material in collaboration with the SPGRC;
- the preservation of other useful wild plant species through *in situ* conservation;
- the active maintenance of collections under short to medium term storage for indigenous and adapted PGR;

– to contribute to expertise development through the provision of training in PGR management, the close collaboration with scientists in commodity research programmes and the representation of MAFF in expert workshops and panels.

The National Plant Genetic Resources Committee (NPGRCom), comprising representatives of several organisations, is responsible for liaising with other relevant institutions on the formulation of policy guidelines. Eight working groups advise on technical matters related to the different crops. Unfortunately, the functionality of the working groups seems to be low partially due to insufficient funding.

The NPGRC has a collection of over 4,500 accessions ex-situ of which copies are held by the SPGRC. Ex-situ conservation of vegetatively propagated crops (cassava and sweet potatoes) has not yet commenced. A limited number of materials is currently maintained in the field at Mount Makulu. The programme has initiated on-farm conservation since 1996 with one of the objectives being the restoration of seed stocks of varieties lost during the drought years (especially for sorghum in the valley areas of Southern Province). Superior traits of lost lines include storability, taste and plant height.

Although wild vegetables are taken up in the collection, some indigenous crops (such as tubers (e.g. Livingstone potato), wild fruits, and plants with medicinal and/or pesticidal properties) are not yet explicitly conserved by the NPGRC (and SPGRC). The field of medicinal plants, in particular, is very complex because it needs testing of plants and active principles as well as additional validation of their impact and knowledge about the utilisation of such plants. Therefore, intensive collaboration with researchers and laboratories will be needed though the necessary funding is lacking at present.

The human resources capacity of the NPGRC is adequate and documentation is up to date. However, current facilities are not adequate to handle all available germplasm in the country. Thus, in general non indigenous varieties and breeder materials are not conserved which may explain why the utilisation of conserved accessions by breeders is still below original expectations.

Ministry of Commerce, Trade and Industry

The Department of Trade of the Ministry of Commerce, Trade and Industry (MCTI) is responsible for the coordination of all WTO agreements and as such for issues related to TRIPS. It does work in collaboration with relevant stakeholders such as MAFF, MENR and the Patent Office (a department of MCTI) in biodiversity issues especially with regard to rights of breeders and farmers on varieties (patents, licensing).

A committee comprising MENR, SCCI, MCTI, NISIR, the private sector and the patent office that has been formed to deal with these issues, is still in its initiatory stage. At this moment, the parties involved are in a phase of demarcating their respective roles and responsibilities with regard to the various issues related to the proper implementation of the TRIPS agreement.

UNZA

The University of Zambia (UNZA) through its School of Agricultural Sciences has incorporated an optional programme on PGR management in its curriculum for the regional M.Sc. programme. Scholarships are provided through IPGRI. The national B.Sc. programme covers important biodiversity aspects such as genetic diversity, ex-situ and in-situ conservation and crop diversification. Biosafety issues will be included into the curriculum in the future. For both levels, legislation aspects with regard to biodiversity and biosafety do not seem to be adequately integrated into the curriculum.

NISIR

The National Institute for Scientific and Industrial Research (NISIR; formerly the national Council of Scientific Research, an independent institute) is involved in issues on biosafety. In that capacity, it has contributed to the formulation of the biosafety chapter in the BSAP and is a member of the TRIPS Committee.

NGOs

As far as the NGOs are concerned, there are several players who are explicitly dealing with biodiversity in the broadest sense while a large number of actors have a more implicit relationship with agro-biodiversity in their interventions.

The most important international NGOs that explicitly deal with biodiversity in general are the World Conservation Union (IUCN) and World-wide Fund for Nature (WWF). IUCN has provided expert support in the elaboration of the BSAP while WWF is strongly involved in wetland management in the Kafue wetland area, one of the two RAMSAR designated areas, in which the possibilities for partnerships with the private sector are being explored.

World Vision International (WVI), Programme Against Malnutrition (PAM), and CARE, dealing with biodiversity in a more implicit way through their involvement in projects on seed multiplication and distribution and/or agricultural development in general, are players in the area of agro-biodiversity. In addition there is a growing number of national volunteer organisations which are involved in environmental management in one way or another. For example, the Environmental Conservation Association of Zambia is an NGO related to the Zambia National Farmers Union (ZNFU) promoting sound environmental management in general. On the whole, NGOs are fully recognised by the GRZ as important stakeholders in development. The majority of NGOs, together with localised projects, have played an important role in seed multiplication and distribution activities after the droughts of 1991/92 and 1994/95.

Local knowledge

Local knowledge systems, often a blend of traditionally and more recently developed knowledge systems in different local institutional settings, are a precious source for the sustainable management of (agro-)biodiversity in Zambia. Especially in the field of crop genetic resources, women are the key players as far as the management of landraces, improved varieties and some indigenous plants under local circumstances

traditional crops is concerned. As such local knowledge systems form an indispensable though still undervalued link of the institutional setting.

2.3.5 Donor policies

In general, all donors active in Zambia have an overall policy on biodiversity (DFID; Kasparek 1998; Sida 1994; USAID 1995; Zon 1995). Although donors appreciate Zambian efforts to manage biodiversity, the case study has not found evidence of country programmes focusing on the promotion of biodiversity or agro-biodiversity in Zambia specifically. This may be partly due to the priority setting by the respective donors in the choice of target countries and the intervention sectors within Zambia. However, the issue of biodiversity is also often implicitly linked to general environmental management in general and the protection of wildlife and specific ecosystems such as wetlands or in agroforestry programmes.

In general, donors in Zambia seem to exchange their experiences with regard to the implementation of biodiversity activities only on a limited scale. Coordination of their activities in this field remains underexposed.

Chapter 3
The Food Crop and Seed Project

3.1 Project History

The Food Crop and Seed Project and its forerunners has been operating since 1981 through the Agricultural Sector Support Programme (ASSP). Support was initially concentrated on plant breeding and seed aspects but later extended to the development of production packages and post harvest technologies. The first programmes to be supported in 1981 were Seed Quality, Seed Training and Maize. The Sida supported maize breeder reconstituted the SR52 hybrid variety[8] after purification of its parents which subsequently led to its release in Zambia in 1983 as MM 752. In 1982, Forage and Pasture and Vegetable programmes were included into the list of programmes. Support for Sorghum, Pearl Millet, Finger Millet and Root and Tuber programmes started in 1983, 1987 and 1989 respectively while Post-Harvest Technology was secured in 1995. There were 12 agreements under the ASSP before the inception of the last FCSP in June 1994 which ended in December 1997.

In addition to the initial focus on breeding (including seed multiplication), FCSP also contributed to the national responsibility for the actual control over seed quality (inspection, seed testing, variety testing, registration) as well as the training of government officers and staff of NGOs involved in seed multiplication and distribution in seed quality aspects (Chalabesa et al 1999; Walton 1997).

The main outputs in terms of the release of new varieties during the period 1995–1997 are highlighted in Table 7. Section 2.1 has described some of the basic data on adoption rates for improved maize and sorghum varieties.

Table 7 Variety output by FCSP from 1995–1997

	Pre-releases	Releases
Maize	18	7
Sorghum	4	2
Finger millet	2	4
Pearl millet	0	3
Forage and pastures	0	0
Vegetables	7	1

[8] In 1960, it was the first commercially released single cross hybrid maize variety in Zimbabwe and had quickly covered ground in the region where it is still being planted, and also maintained by the formal seed sector.

One of the conditions for further funding was the elaboration of a National Seed Policy which is now available in draft form (see section 3.3).

3.2 Description of Aims, Objectives and Activities

The overall objective of the proposed next three-year phase (1999–2001) of FCSP is "to develop and make available appropriate on-farm production and post-harvest technologies in important crops grown by all farmers especially small scale and women farmers. The particular areas of research identified for Sida support in each of the crops are those that are expected to have maximum impact on smallholder production, nutrition, crop diversification, food security and income generation" (Chalabesa et al 1999).

The current proposal for the next phase of the project, which is still under appraisal, plans the support to sorghum, maize, millets, and root and tuber commodity programmes of the Soils and Crops Research Branch (SCRB) of the Department of Research and Specialist Services of MAFF as well as support to ZAMSEED in setting up a Research and Development Department. The non-commodity areas to be supported are post-harvest technology, farming systems research approaches to be incorporated within the commodity programs[9], and project coordination. Four components from the past phase have been dropped which are forage and pastures, vegetables, seed training and seed quality. Reasons are partly related to budget constraints, the successful integration in existing government structures and the poor financial feasibility of the component because of the limited scope (e.g. vegetables) in relation to the crops used and the quality of seeds available on the market.

The overall objective for the research by SCRB is "to provide a high quality, appropriate and cost effective service to farmers which increases agricultural productivity and diversifies production". The specific objectives are (Chalabesa et al 1999):

- To develop cultivars that are stable, of high quality, and resistance to biotic and abiotic stresses.
- To develop appropriate agronomic packages.
- To develop improved post-harvest technologies.
- To adapt and disseminate improved and appropriate agricultural technologies.

The proposed activities comprise breeding, agronomic trials, training, post-harvest trials, and on-farm trials and impact studies.

The overall objective for the research by ZAMSEED is "to produce and supply high quality seed of improved cultivars for a range of crops suitable for different categories of farmers at competitive prices".
The specific objectives are (Chalabesa et al 1999):

- To establish a functional Plant Breeding Research Programme.
- To develop improved cultivars of different crops.
- To improve seed production and marketing capacity.
- To improve company's profitability.

[9] So, instead of seeing farming systems research as a separate component, it will be integrated into the programmes as an intervention methodology in order to achieve better fine tuning between the research agenda and farmers' needs, conditions and opportunities.

The proposed activities consist of breeding, maintenance breeding and seed multiplication, germplasm collection, storage and evaluation, development of seed production technologies, varietal promotional trials, and training.

3.3 National Seed Policy

Sida appraisal and supervision missions to FCSP recommended among other things the development of a National Seed Policy as a condition for future Sida support. Subsequently, MAFF commissioned a Seed Policy study in 1998. The study covered all important issues in the seed industry (Consultancy team, 1999). The National Seed Policy document has since been finalised, approved and adopted by all stakeholders and submitted to MAFF[10]. The policy is yet to be incorporated into the overall Agriculture Policy before submission to the Cabinet.

The draft version outlines the regulation of the Zambian seed industry by defining responsibilities for the public, private commercial and non commercial sector in the areas of PGR conservation including evaluation, research, variety management (protection, release, registration, licensing, maintenance), seed production and marketing including quality control and certification. Propositions are also made for the necessary coordination and regulation of the seed sector, as well as the financial sustainability of the public seed system. The National Seed Policy clearly recognises the different roles of the respective stakeholders in the informal and formal seed sector.

As stated before (Table 6, section 2.3.3), the draft Plant Breeders' Rights Act has been temporarily stalled. This leaves the issue of intellectual property rights in the area of crop varieties uncovered. Some of the persons interviewed by the case-study team are of the opinion that this may have a negative impact on the initiative of the private sector to involve itself fully in crop breeding in Zambia. An expeditious enactment of a revised Plant Breeder's Rights Act duly defining plant breeders' and farmers' rights, can provide for the necessary legal framework which, in turn, seems to be a pre-requisite for the successful and effective structuring of the Zambian seed sector in the near future. Due consideration might be given to the outcome of the regional task force for the write-up of an all African model for a *sui generis* system for breeding rights.

Issues on biotechnology, genetically modified organisms and biosafety are not covered by the National Seed Policy. The National Seed Policy proposes to regulate the import and export of seeds by the application of the existing seed and phytosanitary and quarantine regulations (Plant Pests and Diseases Act) in order to prevent the introduction of pests, diseases and poor quality seed. A considerable number of the persons interviewed have the impression, however, that these older laws show gaps in reflecting recent technological development, and therefore, cannot adequately cover important issues at stake. This is especially felt in international trade of varieties and related technology as well illustrated by the demand of Monsanto to import Bt cotton.

[10] The case-study has not been able to acquire a copy of the latest version that has been submitted to MAFF. However, according to statements of stakeholders interviewed, no fundamental differences exits as compared to the proposal made by the consultancy team.

The National Seed Policy clearly states its interest in further privatisation of the seed sector and to reserve a role for the public sector in "strategic and long-term research which takes care of traditional and minor crops that are important for household security amongst small-scale and vulnerable communities. Consequently, the government will not actively partake in any seed production[11] but will provide the necessary support to such activities carried out by the public sector. ZAMSEED has, out of its historical background as a public seed growing organisation, obtained the rights over varieties bred under the auspices of government.

3.4 Geographical Area

The intervention area of the Food Crop and Seed Project is the entire nation of Zambia. In certain instances, the impact may even show beyond the national borders as specific varieties developed and multiplied in Zambia may be sold to neighbouring countries.

In its breeding policy, the project duly acknowledges the different agro-ecological zones (see Table 2, section 2.1).

3.5 Stakeholder Analysis

The crop commodity programmes of the FCSP in the proposed new phase will be partly implemented by SCRB and partly by ZAMSEED. Seed quality activities in Zambia are implemented under the Seed Control and Certification Institute (SCCI) but will no longer be funded by the project. (see Annex 5 for the organogram of MAFF).

In general, the Zambian seed industry covers formal and informal systems while the formal system includes the public and private sector. The informal sector is made up of farmers and seed producing farmer groups which closely collaborate with NGOs in seed multiplication and distribution. Since the droughts in 1991/92 and 1994/95, NGOs like WVI, PAM, CARE have been active in the seed sector. After the initial free seed distribution schemes aiming at a quick rehabilitation of areas concerned, they adapted the approach towards a larger involvement of farmers and started to become important players in the seed sector. At present, the formal seed sector increasingly recognises the role of the informal seed sector resulting in fruitful cooperation. NGOs normally have good contacts with (groups of) farmers but often concentrate their intervention efforts in selected areas. In order to improve the necessary coordination and to safeguard quality standards, SCCI has the responsibility to coordinate the NGO involvement with regard to seed issues in the National Seed Multiplication Implementation Committee.

Various consultations with relevant stakeholder groups have been organised by FCSP in order to determine priority areas for breeding in the coming three-year period. The consultancy report on the formulation of the National Seed Policy (Musaba et al 1999) gives an extensive overview and analysis of the Zambian seed sector. Because of the ultimate countrywide focus of the project and the responsibility of the

[11] For example, ZAMSEED is now a private company with the majority of shares owned by Swedish organisations, i.e. Swedfund (Swedish public investment fund for development countries; 25%) and Svalöf Weibull (private Swedish company; 27.5%). GRZ through the Ministry of Finance and Economic Development owns 37.5% of the shares while the remaining 10% shares are equally divided among Zambia Seed Producers' Association and Zambia Co-operative Federation.

public sector (SCRB) and the private sector (ZAMSEED) in project implementation, the composition of the group of stakeholders is rather diverse and ranges from government institutions (SCRB, SCCI, Field Services (extension branch of MAFF), UNZA) to private seed companies (profit oriented and not-for-profit), NGOs and seed growers. Annex 6 summarises this stakeholder description by providing details on their status, major function, main collaborating partners and expectations of other stakeholders regarding possible future roles of the most important stakeholders concerned.

The description of different groups of stakeholders in the consultancy report, which is being borrowed by the current project proposal, focuses principally on organisations (including NGOs) and less on farmers. The latter are mainly involved as seed growers and as clients ultimately buying the end product, namely seed. Although the project indicates women as a specific target group, the project document does not apply a gender differentiation. Thus, the definition of the breeding policy and the subsequent strategy, for example, do not make any reference to possible distinctions in varietal requirements based on different perceptions on the production method or the use of the end product(s). This may be partly explained by the very nature of the seed sector and the complexity of seed production. However, the potential of a more intensive involvement of farmers through participatory plant breeding remains underexposed.

Chapter 4 Findings

4.1 Stakeholders' Perceptions

a. Generally, all stakeholders consulted are aware of the overall issue of biodiversity and the relevance of its maintenance. Biodiversity is assessed important for the country's economy especially because it affects the life of the average person. Some interviewees have the impression that local people living in rural communities rich in biodiversity are more aware and appreciate natural resources more as they depend entirely on these resources for their livelihood and that those people who live in a more urbanised setting, tend to exploit the natural resources in a less sustainable way.

b. Overall biodiversity at a national level is discussed in the different fora in Zambia from both a species and ecosystems perspective. Stakeholders see the need to conserve and manage biodiversity in a sustainable manner and ensure equity in sharing benefits derived from the use of biodiversity.

c. Although all stakeholders concerned almost automatically link biodiversity to agriculture and natural resources management, the issue of agro-biodiversity itself still needs an expanded definition and discussion of sub-issues as indicated in sections 1.2.2 to 1.2.5. The role of livestock and its potential damage and/or contribution to the ecosystem are not sufficiently addressed for example. At present, aspects of agro-biodiversity in general and within the FCSP setting in particular are mainly expressed at genetic and species level and much less at the level of functional relationships within a given agroecosystem. Given the wide and positive attitude towards biodiversity, there is an advantageous ambience for such discussion.

d. Stakeholders in general, and breeders in particular, see biodiversity as an important pool of natural resources and thus as an essential source of genetic materials. Therefore, breeders also judge the conservation of diverse genetic materials and good access to them as a pre-requisite for any comprehensive breeding programme[12]. However, opinions among stakeholders differ with regard to the way these materials should be conserved. Stakeholders indicate the following important aspects to be considered in conservation of genetic diversity: the type

[12] Breeders indicate to have adequate access to a wide range of germplasm of both local and exotic materials.

of materials (validation of characteristics), place of storage (ex-situ, in-situ, on-farm), access and related conditions (costs, equity in benefits), quality maintenance.

e. It is commonly felt by the stakeholders interviewed that modern agriculture (using higher levels of often chemical inputs and hybrid seeds) and its related research are not a real threat to biodiversity as the majority of (small-scale) farmers still use traditional farming systems. Although considerable awareness and increased appreciation of improved varieties has been created, farmers are eager to maintain their own local landraces besides the new varieties[13].

f. In general, persons interviewed recognise the importance of indigenous/local knowledge in relation to (agro-)biodiversity but admit that the aspect is not adequately covered yet. Farmers, especially women, are well appreciated for their knowledge of local landraces as well as for their active role as custodians of these genetic resources. Moreover, women seem to have a better knowledge about the uses of real traditional species in the diet like for example tubers (e.g. Livingstone potato) and wild vegetables and fruits. These products still play an important role in food security and are sometimes also appreciated as a delicacies in towns and cities. However, the available knowledge about and experiences with the management of local genetic resources (e.g. variety improvement, crop management, storage, processing, recipes[14]) are not being recorded and/or validated.

g. Stakeholders commonly share the opinion that the liberalisation process in Zambia has positively contributed to the improvement of the seed sector. At present, some eight companies are involved in the national seed sector of which five are active in the crops which FCSP focuses on. This creates the necessary diversity necessary for sound competition and ultimate quality products.

h. The majority of the stakeholders interviewed considers information management (collection, assessment, storage and sharing) in relation to biodiversity at different levels (from policy to implementation at farm level) to be inadequate. The persons interviewed almost unanimously share the opinion that the field of cross-cutting information management is not catered for at all. Stakeholders also point at an existing gap in effective collaboration with relevant international organisations actively involved in agro-biodiversity issues related to the formulation of legislation that duly considers the rights of developing countries. Depending on the respective perspectives for action, there is a general feeling that the information base with regard to technical and legislative aspects is rather narrow in Zambia[15]. This accounts for technical aspects, economic aspects (fixation of royalty and license fees), legislative aspects (plant breeders' and farmers' property rights, biosafety) at the level of policy as well as implementation at farm level. Especially at the level of practical

[13] However, some stakeholders indicate, that in certain areas, the improved sweet potato variety Chingovwa is rapidly replacing some local reddish varieties (see section 2.1 for possible arguments).

[14] Some tubers are known for bitterness and poisonous effects.

[15] A good example is the recent request by Monsanto for the authorisation to trade Bt cotton in Zambia. Some of the interviewees indicated that relevant policy makers might have felt more secure in taking a well justified decision when a more intensive and effective contact had existed with regionally or globally active organisations having specialist expertise in this field.

farming, stakeholders have indicated an articulate need for environmentally sound (and biodiversity saving) production methods that lead to tangible results in production on a relatively short term.

4.2 Impact on Biodiversity

a. The improved varieties developed by the FCSP have largely reached farmers through the efforts of on-farm seed multiplication programmes. Improved maize varieties have been well adopted by small- and medium-scale farmers (up to 70% in Region 2 of which the three hybrids MM604, MM603 and MM752 have been accounting for nearly 80% in 1991). On the average, the improved varieties produce 20-60% higher yields under smallholder conditions as compared to the traditional varieties and certainly have contributed to higher food security at both the household and national level. Even in the drought years, national average maize yields per hectare were higher than those of sorghum. However, in the real dry areas, prospects for sorghum are higher than for maize. Also improved sorghum varieties meet appreciation of smallholders (27% adoption rate) mainly because of the average yield increases and their earlier maturity as compared to the landraces. Especially the latter characteristic has contributed to the widening of the crop genetic diversity in sorghum and as such to increased food security especially at household level in marginal areas.

b. Most of the improved varieties are open-pollinated having a wide genetic base (pearl millet, sorghum) and self-pollinated crops developed from local germplasm. Benefits from new varieties include high yields, disease and insect pest resistance and early maturity. The direct impact of all varieties developed and disseminated by FCSP on crop diversity is not exactly known because the recent impact studies for maize (Howard et al 1993) and sorghum (Chisi et al 1997) have not measured the replacement of landraces. However, the apparent fact that farmers normally integrate a new variety into their entire seed range, would support the hypothesis that total genetic diversity in Zambia within the most important food crops might have increased. This seems to be valid for seed crops, but less so for vegetatively propagated crops such as sweet potato and cassava (see section 2.1 and footnote 13). Besides, large variations may occur between regions and between different farmers. Moreover, data on the exact differences between genetic characteristics of local and improved varieties at the lowest genetic level are not available which makes assessment of the quality of genetic diversity at this level impossible. This gap in information management, in turn, may need to be addressed in the future.

c. The case study has not found an indication of the extent to which the increased availability of genetic diversity at research level within one crop (if breeding materials are well maintained) through the importation of exotic germplasm material, has led to a decrease of biodiversity and associated agro-biodiversity (in both genetic and functional terms) at farm level through the establishment of simplified farming systems based on hybrid maize varieties and the increased

use of fertilisers and pesticides. However, even at present, there is still a strong emphasis within FCSP on crop improvement research without giving due consideration to today's farming conditions. Thus, breeding objectives in the proposal do not reflect, yet, recent shifts in agricultural technology development towards low-external-input and sustainable agriculture (LEISA; e.g. conservation farming and agroforestry which are widely promoted in Zambia; integrated pest management; mixed farming; intercropping) that considers the resource management options available at farm level to a larger extent.

d. In order to contribute to the nation-wide promotion of crop diversification at farm level, FCSP has deliberately taken up the improvement of crops with an apparent minor economic interest for the private breeding companies such as sorghum, finger millet, pearl millet, cassava and sweet potato. Thus, the availability of some good varieties has led to the expansion of the production area for cassava and sweet potatoes in non traditional growing areas (e.g. Southern Province). The case study has not found any indicative data on the possible disappearance of other species because of this expansion, although it will certainly influence to a certain extent the associated agro-biodiversity.

e. The multiplication and distribution activities of the project have largely contributed to the rehabilitation of agricultural production in drought prone areas by replenishing lost seed stocks. Indirectly, this has been very supportive to the restoration of lost agro-biodiversity in specific areas of the country.

f. Although not included in the proposed next phase of the project any more, breeding of pasture crops in the past under FCSP by the Pastures Research Team has helped to increase the access of smallholder farmers to green manure crops (velvet beans, sunnhemp) which are promoted by many soil conservation and fertility improvement projects amongst others by the two Sida funded projects Soil Conservation and Agroforestry Extension Project (SCAFE, now called Land Management and Conservation Farming Project) and Conservation Farming Unit (CFU).

g. Although some indigenous crops (e.g. wild vegetables, tubers, medicinal herbs) still play an important role in certain areas in household food security but also as cash crop (e.g. Livingstone potato), they are hardly considered for improvement by research nor for conservation by the NPGRC[16]. Reportedly, the presence of such plants seems to slowly decline in certain areas which hints at a potential threat of extinction in the future which would imply a substantive loss to biodiversity, particularly because these plants often belong to the really indigenous plants.

h. A major concern for sustainability of on-farm seed multiplication beyond donor support is the inadequate capacity in FCSP for maintenance of breeding materials leading to unreliable supply of good quality basic seed. In general, breeders fully acknowledge the relevance and importance of the conservation of a diverse genetic resource base, because the basic aim of crop breeding is to narrow

[16] Apart from the starting conservation of some genetic material of wild vegetables by the NPGRC.

down this base to such an extent that optimal benefits can be made of the productive traits[17]. Once a final variety has been successfully produced, it is of great importance to maintain the genetic quality of the breeding materials which facilitates continued future breeding from a qualitatively higher level as compared to the original germplasm. At present, the capacity for maintenance breeding in the public sector does not appear to be adequate and subsequent deterioration of breeding materials has taken place. Moreover, basic seed stocks in the country are never adequate especially for groundnuts, sunflower and sorghum. NGOs involved in seed programs usually import seed from Zimbabwe to supplement local stocks. Shortage of basic seed is directly experienced in the seed supply chain as a result of inadequate quantities of breeder seed which leads to a shortfall in the final availability of seed at farm level.

The principal advantages of proper maintenance breeding are:

1. considerable reduction of breeding costs because breeding can start from high level and quality parental material;
2. quicker release of new varieties suiting changing farming conditions (at present agro-ecological and socio-economic conditions change faster than ever before).

4.3 Roles and Responsibilities

a. In general, stakeholders from government as well as NGOs involved in biodiversity issues, do exchange views on (agro-)biodiversity even though no central coordinating body has been appointed. The basis for cooperation seems to be largely based on the professional interest of individual staff members. It may be expected that the BSAP, once approved by Cabinet and put into effect, will largely contribute to a more intensive coordination and collaboration between the relevant stakeholders at the different levels.

b. Although the Ministry of Environment and Natural Resources has overall responsibility for all issues pertaining to the environment, natural resources and consequently biodiversity, it has no authority over other ministries and cannot effectively enforce policy and legislation. Stakeholders interviewed experience this a serious gap in sustainable biodiversity management.

c. Within the Ministry of Agriculture, Food and Fisheries, the responsibility for biodiversity has been largely delegated to the NPGRC because of an initial and historical focus on genetic conservation. There is a tendency among other stakeholders within MAFF and FCSP, to refer all agro-biodiversity issues to the NPGRC. Although the latter is very active and effective in promoting genetic conservation in general and agro-biodiversity in more particular, it does not seem justified to designate, even unintentionally, this quasi overall responsibility on all agro-biodiversity issues to the NPGRC. It bears the risk that the other pertinent stakeholders do not duly reflect on possible consequences of biodiversity aspects for their own work. As a

[17] Only the initial crop improvement efforts focused on exotic germplasm which resulted in the development of varieties and single cross hybrids with poor adaptation and acceptability at farm level. Fortunately, a general trend at present towards increased triple-cross hybrid production in Zambia in order to broaden the productive traits of maize hybrids, is observed.

result, biodiversity may become a stand-alone theme which is not really integrated in policy and implementation. Above all, the NPGRC's operational capacity does not seem to be sufficient for such an umbrella function, mainly because of limitations in the availability of funds.

d. Although seed quality is the core business of SCCI, it does not take a pro-active stand in advancing the issues of intellectual property rights in relation to varieties and plants and of biosafety (especially for GMOs). It seems to be conducive to private plant breeding companies, farming communities and other stakeholders that conspicuous legislation be formulated, approved and enacted. An essential condition is to look into is the concrete possibilities for effective monitoring and enforcement.

e. The issue of property rights is indicated as a concern especially by those stakeholders directly involved in breeding and seed multiplication, namely private breeding companies, SCCI, and NGOs. Breeders are concerned about the fact that the Plant Breeders' Rights Act has not been enacted. This is viewed as a serious constraint for breeding as economic interests are not sufficiently protected. Most players in the seed sector (government as well as non government) cannot easily accept the preferential position given to ZAMSEED by GRZ as far as the exclusive rights on varieties developed by public breeding in the past are concerned and by Sida through a possible funding in the next phase of a Research and Development component[18]. The fact that the NPGRC is involved in the formulation of an all African sui generis system of farmers' rights is laudable and indicates the interest of GRZ in defending the interests of its farming community as far as property rights for crops and plants are concerned.

f. Research on smallholder crops of low interest for the commercial sector, is still defined as the responsibility of SCRB, whereas the multiplication of seed can be carried out on-farm. The current proposal of the next phase of FCSP lacks a description of specified breeding objectives in relation to farmers' requirements for the different agro-ecological regions. FCSP researchers ranked breeding as number one priority while stakeholders ranked breeding as number three. The proposed integration of farming systems research into the other project components as an approach offers scope for more involvement of farmers in plant breeding (priority setting, own experimentation and evaluation), maintenance breeding, seed multiplication and dissemination.

g. Although FCSP identifies women as a specific target group, a gender impact assessment has not been carried out and the project document does not specify any gender differentiation with regard to priority setting and target groups to work with at district level. Thus, the definition of the breeding policy and the subsequent strategy, for example, do not make any reference to possible distinctions in varietal requirements based on different perceptions on the production method or the use of the end product(s).

[18] The appraisal report discusses this somewhat controversial issue because ZAMSEED is a private company and is just one of the players in the private seed sector.

h. A large number of NGOs are involved in promoting on-farm seed multiplication throughout the country. Two of such programmes are supported by Sida and implemented by PAM and ZAMSEED. Apart from improving farmers' access to seed of improved varieties, farmers' capacity in seed production techniques has been greatly enhanced through training provided in conjunction with the SCCI and the Sida funded project on Economic Expansion in Outlying Areas (EEOA) in the case of the ZAMSEED Programme. PAM has, among the program's objectives, the development of sustainable cropping systems through the utilisation of soil conservation and fertility technologies.

i. At present, the main formal knowledge base with regard to (agro-) biodiversity seems to be concentrated in the capital Lusaka. Because of the on-going decentralisation process and subsequent delegation of responsibilities to the provincial and district levels, a knowledge gap may arise in the coming years.

j. The case-study team has not found evidence that Sida has actively promoted the incorporation of biodiversity into FCSP or any of its other projects in Zambia. Sida's country strategy for agriculture in Zambia (only available in Swedish) indicate amongst others the areas of crop improvement, conservation farming, natural resources management, social development and creation of economic opportunities, and development of effective marketing.

k. The importance of the promotion of biodiversity is recognised by many donors, but does not seem to be coordinated in a comprehensive manner. This can cause inefficient use of resources (financial and human), and may even create disharmony among the different stakeholders especially in conjunction with the complexity involved in the subject of biodiversity.

4.4 Instruments

a. Zambia has approved and ratified most of the international conventions related to biodiversity apart from the binding UPOV Convention. However, as a member of WTO, Zambia must have put in place the necessary structure and legislation before the year 2000 the latest as far as plant and variety issues are concerned. The existing draft Plant Breeders' Rights Act in conjunction with the expected all African sui generis system form a good basis for complying with this condition.

b. There is a considerable number of legislative documents that deal with elements of biodiversity in general and with agro-biodiversity in particular. The majority of persons interviewed shares the opinion that the enforcement of such legislation is not adequate yet. Moreover, there is a general feeling among stakeholders in Zambia that legislation in the area of biodiversity needs reviewing and adaptation to changed circumstances because:

    1. technological development in the agricultural sector has led to new products (e.g. GMOs) that may have considerable implications on the environment; this requires suitable regulation, monitoring and the possibility of sanctions in the areas of biosafety and genetic biodiversity;

2. development (technological, economic and social) is increasingly becoming privatised, market oriented and commercialised; financial interests of different stakeholders become an influential factor in the mutual interaction and need, therefore, a solid and sound legal framework;
3. growth in national and international trade volumes of agricultural goods requires regulation of quality aspects in order to optimally meet market demand; it is noted that environmental issues are also becoming a quality criterion especially on the markets of the European Union and Northern America.

c. The BSAP, expected to be approved by Cabinet in the second part of 1999, seems to offer a good framework for tackling issues of biodiversity. Because it has been elaborated in a consultative process, the contribution by the different stakeholders to the ultimate implementation is expected to be satisfactory. Its emphasis on a long-term process of gathering more data on important biodiversity issues, in order to create a foundation for exchange among stakeholders and sound decision-making, is an asset.

d. There is general consensus among stakeholders that, while in the broad sense the National Seed Policy has addressed biodiversity, issues relating to biotechnology, genetically modified organisms and biosafety have not been adequately covered. It is hoped that these issues will be well articulated in specific legislation through enactment of statutory instruments. The technical consensus reached enables the different players in the seed sector to use the National Seed Policy as a guideline for practical implementation already.

e. Contrary to the normal condition for funding by Sida, the case study has not found evidence of the implementation of an Environmental Impact Assessment (EIA) during the preparation of the FCSP project. Biodiversity has not been explicitly considered by the project owner in the project design nor is there evidence that Sida has exerted any influence to do so. As a result, the issue has not been an explicit factor in implementation: no indicators for the possible impact on biodiversity have been developed nor has the impact on biodiversity been actually monitored. The project proposal for the next phase has not altered this situation.

f. Stakeholders in Zambia see the need for the set-up of adequate local seed reserves for safeguarding crop diversity and as such an aspect of biosafety. Such reserves can be used in disaster situations when seed stocks at farm level have to be replenished on a mass scale. The operationalisation of such seed reserves including the financial implications, possibly best organised at community or district level, still needs thorough reflection though.

g. An important constraint in the promotion of crop diversification in Zambia as far as cereals are concerned, is the continued high demand for maize nation-wide. Although farmers seem to be willing to diversify their cropping pattern, they are not in a position to influence the effective market demand in the short term. Because this demand is decisive, all the more in a society characterised by a high rate of

urbanisation, the change of food habits towards the incorporation of small grains in the diet is a slow process which needs to be intensively supported by proper promotional activities.

h. A specific concern is the future financial sustainability of research, public or private, involved in smallholder crops focusing on food security. At present, this type of research is still fully dependent on government or donor funds. It may prove difficult, if not unrealistic, to acquire sufficient funding from the commercial market players. This particular sector is still characterised namely by relatively low cash turn-overs because only relatively small proportions of the total production are sold on the market[19]. In addition, the existing trend in public national and international research towards the development of open pollinated varieties makes it easier for farmers to multiply seed themselves. Consequently, efforts towards the successful commercialisation of the research and seed sector may be seriously impeded.

i. Sida's guidelines for environmental impact assessment (Sida 1998a) define that, while the project owner remains responsible for carrying out an EIA, assessment of the outcome of the EIA will be Sida's responsibility. The specific questions in the checklists to be used by Sida programme officers for assessing an EIA emphasise the following areas to be covered for the impact on biodiversity:

    1. Impact on biodiversity at both ecosystem and species level.
    2. Local knowledge is being recognised as an area worthwhile developing.
    3. Impact on sensitive ecosystems.
    4. The influence on the introduction of new species.
    5. Risks of spreading plant and animal diseases to cultivated or wild species.
    6. Risks of the spreading of transgenic organisms or their genes.

The checklists do not indicate how the answers to these questions are to be interpreted. Apart from a general focus on biodiversity and little specification in relation to agro-biodiversity in particular, the impact of interventions on the functionality of ecosystems or their components is not being addressed. In addition, the questions do not reflect the areas of debate as indicated in sections 1.2.2 to 1.2.5 such as the influence of the dynamics over time or the perspective of stakeholders on the validation of biodiversity. Consequently, the questions create the impression that biodiversity is a somewhat static and absolute parameter that can be measured in easily quantifiable terms. Thus, the sustainable utilisation in a time perspective on the basis of process management aspects is not mentioned as a possible opportunity for biodiversity conservation. Above all, the checklists do not reflect the wider perspective and challenges that are addressed in Sida's policy document on biodiversity (Sida 1994).

[19] Chisi et al (1997) found that in the period 1991–1995 approximately 10–20% of the entire sorghum production and 15–35% of the total millet production were sold. For maize the proportion sold (40–58%) was notably higher.

Chapter 5
Lessons Learned and Recommendations

The main lessons learned and the subsequent recommendations and suggestions for the project have been formulated in section 5.1. Reference has been made to the four case-study screens while a deliberate differentiation between recommendations and suggestions has been made. Recommendations have a higher priority than suggestions, and their implementation, if accepted by the relevant stakeholders, would be subject to evaluation in a next phase of the project. The principal selection criterion for this distinction is the degree of possible feasibility of application within the project setting.

Section 5.2 describes, in the form of critical issues, the lessons learned for Sida's biodiversity mainstreaming process.

5.1 Recommendations to the Project

5.1.1 General

Considering the facts that the appraisal of the project is in a very advanced stage as compared to the case study, and that Sida has not requested the project to consider biodiversity as a basic principle for the formulation of the next phase, it is recommended to Sida that the present case-study report shall neither be presented as an appendix to the appraisal report nor that selected parts will be presented under the headline "Biodiversity" in the appraisal report. However, it is recommended that the project owners, within the framework of the approval conditions for the next phase and in close collaboration with the donor, look for opportunities on when and how to incorporate in the coming project period important issues of agro-biodiversity (as indicated in the conclusions, suggestions and recommendations) which are related to the core activities being breeding and seed multiplication and distribution.

5.1.2 Stakeholders' Perceptions

1. The existing broad recognition of biodiversity as an essential asset for Zambia creates a positive atmosphere to include biodiversity in many projects in general and the present project in particular. Although biodiversity has never been a conditional aspect of the project, the topic of (agro-)biodiversity is on the development agenda in Zambia in general while FCSP staff is well aware of relations between breeding and agro-biodiversity.

2. Because of their enormous complexity, the concepts of biodiversity and agro-biodiversity can only be understood in parts. Thus, in the project for example, agro-biodiversity is not much discussed in terms of functional relationships at the level of agroecosystems nor is the related local knowledge recorded or validated. Indigenous crops are not considered a key subject of interest to breeding research and genetic conservation. Issues like intellectual property rights (of breeders as well as farmers), biosafety and biotechnology in agriculture have become areas of interest only rather recently. Moreover, the perception on agro-biodiversity and its related management strongly depends of the perspective of the respective stakeholder. It is suggested therefore, that the project and Sida consider setting up an intensive interaction process with relevant stakeholders of FCSP aiming at mutual learning and a deepening of the insights into the complexity of biodiversity, and associated agro-biodiversity. On the basis of the broad picture of the importance of biodiversity, the topic should later be narrowed to the goals and activities considered important for the particular intervention. Inventorying gaps in knowledge and information may prove to be a valuable component of this activity.
3. Stakeholders unanimously indicate a serious gap in information management on biodiversity issues, ranging from policy to implementation level in terms of collection, assessment, storage and dissemination. It is recommended, therefore, that Sida consider funding initiatives in Zambia that aim at redressing gaps in information and knowledge in the field of agro-biodiversity.

5.1.3 Impact on Biodiversity

1. Since its inception, the project has largely contributed to the improvement of the genetic resource base of the crops targeted (maize, sorghum, millets, fodder, legumes, roots and tubers) in two ways. First, the existing germplasm which had deteriorated in quality (productive capacity, susceptibility to pest and diseases) has been cleaned. Second, through its international contacts, the project has been able to import considerable quantities of exotic germplasm of high quality and to enrich the genetic resource base. As the majority of these food crops in Zambia (often referred to as traditional) originate from genetic centres in Latin America and Asia, the genetic variety within these crops in Zambia was relatively low.
2. The project has considerably contributed to crop diversification and subsequent increased food security at household level through the increased availability of a number of crops and varieties at farm level. Benefits from new varieties include higher yields, disease and insect pest resistance and early maturity. Although a positive impact on poverty alleviation may have been the result, the case-study team has not found direct evidence for this because of the lack of monitoring data.
3. Although biodiversity, within the framework of the project, is mainly discussed in terms of crop diversity at the genetic level, precise data on the actual qualities of the genetic material available in the country

are lacking. Neither is the impact of the project at agroecosystem level known. Breeding objectives of the proposed next phase lack an acknowledgement of recent shifts in smallholder farming technology to LEISA and the prevailing current farming conditions. Collaboration with projects having this approach is scantily proposed for the new phase. Therefore, it is suggested that the project consider directing breeding towards the development of varieties that can thrive under low-external-input conditions, where farmers will (have to) make optimal use of locally available resources like for example wide crop rotations, intercropping, green manure, kraal manure, agroforestry, mixtures of varieties.

4. The capacity for proper conservation of breeding materials at the respective public sector research stations in terms of facilities and human resources is not sufficient and needs to be enhanced. The case study, therefore, recommends that the project, in close collaboration with Sida, the private seed companies, NGOs and the farming community, study the possibilities for the establishment of an adequate capacity for high quality maintenance breeding by the public sector in Zambia. Such well functioning capacity, when duly considering the financial aspects and commitments of the different stakeholders, may be an important asset for the following reasons:

a. The availability of and adequate access to good breeding material may be interesting for the private sector for taking up final breeding of new varieties that are adequately suited to the Zambian farming conditions.

b. The related payment of royalties and licences may become a precious source of income which, in turn, may contribute to a future higher financial independence and viability of the public crop research sector.

c. Risks in the area of biosafety (genetically modified organisms, contamination, impurity of seed) may be reduced because of an expected decline in the need for importing ready varieties from abroad.

5.1.4 Roles and Responsibilities

1. Considering the potential risk that biodiversity may not become an integral component of agricultural policy due to NPGRC's sole representation of MAFF in BSAP which in itself forms a useful basis for discussing the issue of biodiversity at a national level in Zambia, it is suggested that MAFF broaden its representation to BSAP beyond NPGRC. Because it is expected that the functionality of biodiversity will become an important topic of discussion in the future, the involvement of production oriented departments of MAFF seems logical. This will enable MAFF to integrate biodiversity in its policy and to enrich the ongoing national debate on biodiversity by expanding on concrete agro-biodiversity issues related to the sustainable use of natural resources for agricultural production.

2. The role of farmers in and their possible contribution to the breeding process and seed supply (and management of biodiversity in general) remains underexposed in the proposal for the next phase while no gender differentiation has been applied either. Considering the earlier

made suggestion to adapt breeding research more to the current farming conditions, it is suggested, furthermore, that the project consider to increasingly formulate breeding objectives in the future in close collaboration with the relevant stakeholders. Such participatory breeding may be achieved by involving farmers early in the breeding process as opposed to conducting on-farm trials at the tail end of the variety development process and by including more local genetic resources in the breeding itself. This is especially valid within a context of promoting (agro-)biodiversity in which SCRB will not be in a position to do all breeding research for crops with a genetically diverse genetic resource base which is the case for typical smallholder crops. Within this context, it is also suggested therefore, that the project seriously consider seeking collaboration with other programmes addressing ecosystems resource management issues within SCRB (i.e. Soils Research Team and the Crop Diversification Program) and outside SCRB (e.g. SCAFE, CFU, animal husbandry department of MAFF). These programmes have developed interventions potentially aiming at increased crop performance through the practise of improved farm management techniques duly recognising the locally available resources base.

3. Because of the widely accepted role, knowledge and involvement of women in the field of agro-biodiversity management, it is recommended that the project consider associating a more explicit gender perspective on the shortest possible term.
4. International conventions like UPOV and CBD have formulated opposing principles as compared to the sharing of knowledge and benefits of biodiversity components, especially when dealing with new varieties. Because the private seed sector has vested huge financial interests through the development of expensive plant varieties, judicial implications may become of major importance in the near future. This may imply the costly assistance of law institutes with international experience. It appears that relevant Zambian organisations have relatively few international contacts in this specific field related to agro-biodiversity. In order to help Zambia adequately prepare for possible future litigation's in the area of plant rights and biosafety, it is recommended that Sida consider providing support to GRZ with the establishment and strengthening of the necessary legal capacity and network. This network may be operational in the Southern African region or at a more global level. Support for Zambia may be needed in the form of technical assistance for the elaboration of appropriate legislation, support in the related enforcement in Zambia which is generally found to be weak, and/or support in subsequent legal assistance with regard to specific national and/or international litigations.
5. Although there is no evidence that Sida has actively promoted the incorporation of biodiversity into projects and programmes in Zambia, there is a nation-wide adherence to the importance of the conservation of biodiversity for sustainable development. The concepts of biodiversity and agro-biodiversity themselves, let alone the consequences for practical implications, are still under debate at many

international fora. Consequently, actual Sida requirements with regard to conditions and targets for biodiversity, should be generally modest, realistic and reflect the specific Zambian situation. In order to effectively mainstream biodiversity in existing projects in Zambia, it is recommended that Sida commence a stakeholder consultative process to discuss agro-biodiversity with the relevant partner organisations. This has been confirmed by the Zambian stakeholders during the debriefing seminar. Specific activities may consist of a series of introductory workshops on the issue of (agro-)biodiversity, other policy issues (of Sida and GRZ) the inventory of information gaps, the definition of goals and activities, criteria for monitoring and evaluation, the responsibilities of the stakeholders concerned (public sector, private sector, farming community, NGOs) and the instruments to be used (e.g. legislation, monitoring, public-private partnerships).

6. Because donor coordination in Zambia with regard to the promotion of biodiversity is not intensive, it is suggested that Sida, having a keen interest in mainstreaming biodiversity, put the issue of coordination on the agenda of donor consultation. This may be particularly valuable for the development of support in the field of PGR legislative issues. Other donor organisations (GTZ) and IPGRI are known to develop initiatives with similar objectives.

5.1.5 Instruments

1. Since the BSAP offers a good basis for further elaborating issues of biodiversity relevant for Zambia, and duly recognises issues of agro-biodiversity, it is recommended that the project consider involving itself in the implementation wherever appropriate. Special attention may be given to the establishment of effective mechanisms for exchange of information, fine tuning of implementing activities, principles of collaboration and monitoring of progress. Thus, the BSAP may fulfil the role of a platform on issues of biodiversity and agro-biodiversity.
2. Although the National Seed Policy forms an acceptable basis for regulating the seed sector in Zambia while addressing biodiversity issues, it is suggested that SCCI, in close collaboration with the project, other relevant stakeholders and the BSAP, elaborate proposals for statutory instruments for acknowledging important issues related to biotechnology, genetically modified organisms and biosafety.
3. Zambia positively adheres to all relevant international treaties and conventions. Conspicuous legislation with regard to intellectual property rights (for breeders and farmers) is still lacking, however. It is suggested therefore, that SCCI in close collaboration with the project and other relevant organisations, consider pro-actively stimulating the timely establishment of such legislation by duly recognising the outcome of NPGRC's involvement in the task force for the production of an all African sui generis system as well as the interests of private breeder companies.
4. In order to recognise the generally felt need to set up mechanisms for the conservation of local varieties of the most essential crops, it is suggested that the government and NGOs actively involved in seed

programs, while closely associating the project and other stakeholders in the seed sector, commence and guide a reflection process on the operationalisation of the future establishment of strategic seed reserves at community level. Special attention is to be given to the financial implications and the sustainability on the long run without external funding.

5. Zambian farmers seem willing to diversify their cropping pattern provided concrete and profitable market outlets can be tapped. However, the Zambian cereal market demand is still characterised by a high demand for maize. Demands for other products, especially by the formal processing sector, are still relatively limited and often conditioned by quality requirements which are difficult to comply with by smallholders. It is suggested therefore, that Sida in close collaboration with relevant stakeholders, the private sector and external marketing experts, consider the elaboration of effective mechanisms for linking the private processing sector to the smallholder farming community.
6. In order to contribute to improved community biodiversity management, it is recommended that the project, in close collaboration with NPGRC and relevant NGOs, consider providing technical expertise for strengthening the capacity of community groups, district level field extension staff and NGO staff in carrying out in-situ conservation of locally available genetic material, the recording and validation of local knowledge and the promotion of local genetic information centres.
7. Apart from relatively general statements on the contributions to sustainability, biodiversity or poverty, only limited details in qualitative and quantitative terms can be made because the project has not monitored the impact on these issues, and hence, the necessary precise data are lacking. Although it is observed that Sida has never put such monitoring as a condition for project funding, it is recommended that the project look into opportunities for including the monitoring of possible effects on agro-biodiversity into the project. Considering the recommended intensive consultation of relevant stakeholders, monitoring mechanisms need to reflect the outcome of a consultative process. Annex 7 proposes a possible matrix for monitoring basic agro-biodiversity factors worthwhile addressing in agricultural projects which can be amended during the stakeholder consultative process. During the consultative process, also criteria and indicators for the impact on other developmental issues such as sustainability, poverty and gender can be identified and included into the monitoring tools.

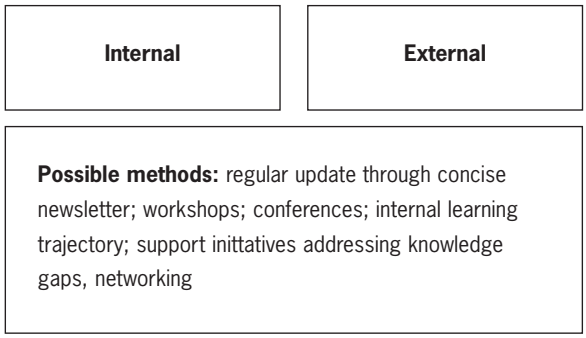
5.2 Issues for Sida's Biodiversity Mainstreaming Process

The biodiversity mainstreaming process that Sida has embarked on can be characterised by an internal component and an external component. The external component focuses on the actual mainstreaming of biodiversity issues in the respective programmes and projects while the internal component deals with aspects within Sida's own organisational setting. For the latter a distinction between headquarter staff and em-

bassy based staff may be useful because embassy staff assumes a vital responsibility in linking the internal and external mainstreaming process. Considering the nature of activities performed at the various levels, different methods, techniques and tools may have to be developed and used in order to effectively integrate biodiversity in Sida's development effort at large.

The case study has revealed certain areas and issues which play an eminent role in biodiversity management, and resultantly, are important to be looked into in the next phase of the mainstreaming process. These areas are knowledge base, agricultural development approach, stakeholder involvement, legal rights and benefit sharing, and analytical tools and guidelines.

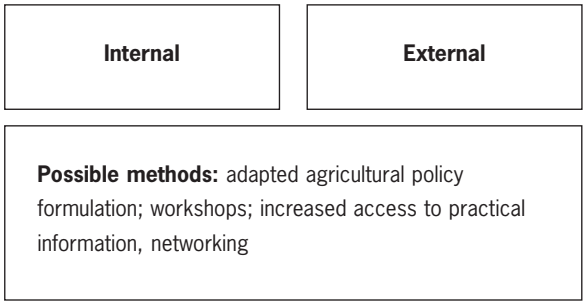
5.2.1 Knowledge base



The issue of biodiversity, ranking high on the international development agenda, is increasingly recognised as an important natural resource like water, soils and air. In addition to its intrinsic value, also an economic value is being adhered to biodiversity. Subsequently, biodiversity needs appropriate management which reflects the dynamics related to the respective contextual situation. However, several factors make that there is a lively debate on the potential ramifications. Because of its inherent complexity and dynamics the concept of biodiversity can only be understood in parts and the knowledge base about the concrete implications of improved or enhanced biodiversity in terms of effects on for example agriculture is still not comprehensive or incontestable. This easily leads to different perceptions on the importance of biodiversity and the potential contribution to sustainable development in general and poverty alleviation, food security, gender balance, environmental stability, equity and democracy in more particular (see also section 1.2 and Annex 7). As a consequence, considerable effort must still be put into the improvement of the information flow on critical biodiversity issues so as to continuously deepen insights as an effective element of effective mainstreaming. In addition to conceptual aspects and the debates, special attention is to be given to concrete information about the positive contribution of improved management of biodiversity on the key development objectives and on the differentiation in information needed by the different target audiences. For example, the demand by Sida embassy staff negotiating projects with partner organisations may considerably differ from information needs of Sida headquarter staff for informing the Swedish parliament on progress made in the promotion of biodiversity as an

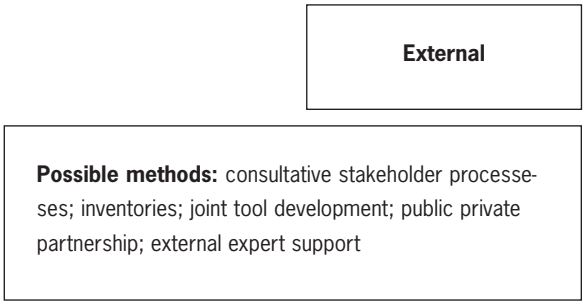
obligation to the CBD, or a project leader working with farmer groups experimenting with biodiversity at practical farm level. An increased awareness of donor representatives and understanding of the type of activities that can be implemented, and the type of impact that should be considered can trigger and stimulate the interest of potential partners.

5.2.2 Agricultural development approach



Biodiversity issues are relevant in both industrialised and developing countries, although the character of the issues varies. Developing countries – in a general sense – are assumed to harbour a larger amount of biodiversity (in terms of within and between species diversity). In agriculture, the level of biodiversity seems, to a certain extent, related to the input level of the production process. The degree in which the improvement of biodiversity is being addressed at practical implementation level is related to the agricultural farming system adopted. Farmers applying low-external-input and sustainable farming systems enhancing the sustainable use of locally available resources tend to consider biodiversity as a natural resource more easily than their colleagues applying high-external-input methods. Thus, the effectiveness of the promotion of biodiversity may be increased if a LEISA development approach is being adopted which actively stimulates the integration of functional relationships as part of farm management.

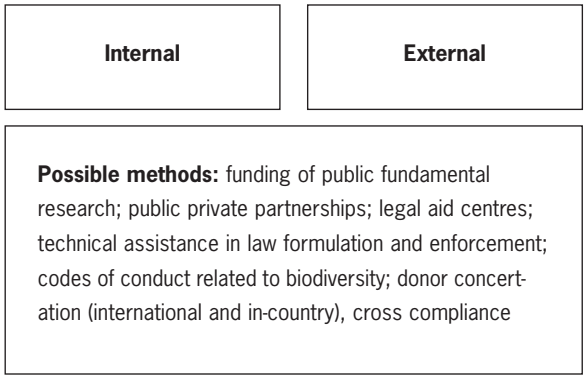
5.2.3 Stakeholder involvement



Considering the fact that the interpretation of biodiversity management strongly depends on the perceptions and perspectives of the stakeholders concerned, the validation of biodiversity evolution over time needs intensive and continuous stakeholder consultation leading to agreement on its importance and planned activities. Mainstreaming biodiversity into a project should be incorporated in an early phase of the project cycle in

order to successfully integrate it in project formulation before critical moments of appraisal. Special attention is to be given to the mutual enrichment of the different knowledge bases of the stakeholders concerned acknowledging gender aspects, the identification of relevant biodiversity aspects, the shared understanding of how these relate to the goals, objectives and activities (in other words the arguments for managing biodiversity), the possible impact on the environment and the expected contribution to other key development issues, aspects of cost and benefit sharing (see below) and related procedures for monitoring and evaluation (elements, criteria, indicators, responsibilities, financial consequences). A concept such as presented in section 1.2.5 (Figure 2) could be used as a concept for projects related to plant genetic resources. Annex 7 describes important elements for a consultative process taking stakeholder involvement as a starting point for discussing and identifying the basic agro-biodiversity factors possibly at stake. Subsequently, these elements can be used as a guideline for the development, in workshops/ meetings, of an instrument for project identification and formulation as well as the further elaboration of an appropriate monitoring and evaluation system. It is suggested that such stakeholder consultative processes at a regional, country level or project level, may need to be supported/ guided by an external expert team.

5.2.4 Legal rights and benefit sharing



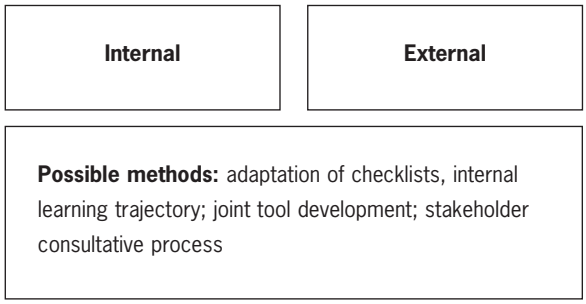
Because of the complexity of biodiversity, a need for more fundamental and exploratory research seems a necessity. In a political climate of continued privatisation and monetarisation of the economy, aspects of biodiversity that have no direct profit for the private sector tend to be neglected, however. The public sector in developing countries has a definite role to play in such fundamental research. Considering the fact that much biodiversity relevant for global sustainability is found in developing countries, external financial support to serious public research efforts seem well justified.

A special area to look into is the remuneration of stakeholders for executing public tasks in the field of biodiversity (e.g. conserving a local variety). Inherently to the increasing acceptance of biodiversity as a valuable pool of natural resources and as such for agricultural production, diverging interests develop as far as the access to and the control over these resources are concerned. This will increasingly have repercus-

sions onto the intertwined issues of intellectual property rights (of breeders as well as farmers) and benefit sharing, possibly leading to an increase in the number of litigations over (agro-)biodiversity issues especially in relation to plant varieties, genetically modified organisms and biosafety with large financial interests at stake. Subsequently, donor support in the legal field may prove to be essential in safeguarding the sovereign rights of nations and farming communities in developing countries as far as biodiversity is concerned.

Long-lasting positive impact on biodiversity may be strongly enhanced through the establishment of effective partnerships between the public and private sector (inclusive of farmers) which are backed by the international donor community.

5.2.5 Analytical tools and guidelines



The framework terms of reference for EIA in Sida's guidelines are comprehensive and acknowledge the necessity for including stakeholder groups potentially concerned by a project into the EIA process.
The terms of reference also indicate that trends (past and future) have to be addressed in the EIA. However, the checklists in the guidelines serving as tools for assessment of the EIA by Sida programme officers neither fully reflect the comprehensiveness of the EIA nor the complexity of biodiversity and areas of debate as indicated in sections 1.2.2 to 1.2.5 such as the influence of the dynamics over time or the perspective of stakeholders on the validation of biodiversity. The checklists might be adapted towards improved insight into operationalisation of biodiversity management by including process management aspects such as development of biodiversity over time, the impact of interventions on the functionality of ecosystems, the perspective of stakeholders on the validation of biodiversity, or increase in knowledge base.

The effort put into the promotion of biodiversity by Sida calls for monitoring and reporting to the respective administratively and politically responsible bodies. The joint development of tools that reflect the requirements of the various levels of hierarchy may contribute to an improved internal understanding of the issue of biodiversity and the progress made. Moreover, it may considerably increase the efficiency of monitoring procedures.

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Biodiversity Funding: *http://www.biodiv.org/chm/techno/funding1.html*

Biodiversity Related Conventions: *http://www.biodiv.org/rioconv/websites.html*

CBD Convention on Biological Diversity: *http://www.biodiv.org*
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Ratification list.
Text of the Convention

Environmental Organisations: *http://www.geneva.ch/EnvironmentalOrg.htm*

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Global Plan of Action for the conservation and sustainable utilization of plant genetic resources for food and agriculture.
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DAD-IS (Animal Genetic Resources).

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IPGRI: *http://www.cgiar.org/ipgri*

RAFI (Rural Advancement Foundation International): *http://www.rafi.ca/*

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Maria Schultz

Diarienummer:
NATUR-1998-04801

TERMS OF REFERENCE FOR BIODIVERSITY CASE STUDIES

1. Background

In "Sida and the Convention on Biodiversity" Sida assumes the responsibility for mainstreaming[1] aspects of biodiversity into all programmes, starting with the Department for Natural Resources and the Environment (NATUR). The mainstreaming will focus on analysing the consequences for biodiversity of the programme/project and on making stakeholders, women as well as men of different ages, aware of the importance of biodiversity on all levels from gene, population, species, functions and ecosystems, both wild and cultivated biodiversity. Mainstreaming of biodiversity will have more relevance in some programmes/projects of development cooperation than others. The reason for the selection of NATUR as the first department at Sida in the mainstreaming process is that NATUR is responsible for contributions to agriculture, forestry, fishing, etc which depend on biodiversity and have a direct impact on biological diversity.

The objective (according to the Sida-memo on "Mainstreaming of Biodiversity at Sida – phase 1", appendix 1) of this work is:

"*that consequences for biodiversity are analysed in the project identification, planning process and follow-up of all programmes and projects supported by Sida-DNRE, as part of the EIA, to minimise negative effects and also point out positive impacts for biodiversity*"

A simultaneous processes take place with the same purpose of mainstreaming biodiversity into development cooperation programmes, e.g. the Biodiversity in Development Project (BDP) undertaken by EC in collaboration with DFID and IUCN. A coordination with the process in the BDP will take place.

2. Purpose and scope

As part of the process of mainstreaming biodiversity aspects into preparation, implementation and monitoring of Sida-DNRE´s natural resources management and rural development programmes, a number of case studies will be undertaken. These will form the base for developing hands-on methods and guidelines on biodiversity mainstreaming for primarily Programme Officers at Sida-DNRE.

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[1] Mainstreaming - integrating biodiversity aspects; consequences for biological diversity shall be analysed and taken into consideration in all programmes and projects.

Sida will obtain inputs on:

- methods for how aspects of biodiversity can be mainstreamed into both the assessment phase of a project/programme and on-going projects/programmes

- how to monitor aspects of biodiversity in the programmes/projects (through environmental indicators etc).

3. Tasks
The task include:

3.1 Undertaking case studies in connection to three to four Sida-DNRE bilateral programmes.
The case studies shall describe and analyse to what extent biodiversity aspects have been considered within the programme context. Two Sida-programmes have so far been identified as suitable for case studies: The Joint Forest Management Programme in Orissa, India, presently under preparation, and the Mountain Rural Development Programme (MRDP) in Vietnam. One to two more case studies remain to be identified from Africa, and possible suggestion include the Region 3-programme in Ethiopia, LAMP in Tanzania, the agricultural sector programme in Zambia, the planned support to the agriculture sector in Mozambique. Other options are the Lake Victoria-initiative, or the water-related activities in southern Africa.

The case studies shall cover the following questions:

1. Background
Background and history of the project/programme, including description of the programme's various phases and the national development context to be able to understand in which context biodiversity is to be mainstreamed. This includes a description of policy and legal framework for the country. Which treaties, binding and non-binding, have been adopted such as:

- World Intellectual Property Organisation's (WIPO's) Union for the Protection of New Varieties of Plants (UPOV), binding
- World Trade Organisation's (WTO's) Trade-Related Aspects of Intellectual Property Rights (TRIPs), binding
- Convention on Biological Diversity (CBD), binding
- Food and Agriculture Organisation's (FAO's) International Undertaking on Plant Genetic Resources and the Global Plan of Action for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture
- Rio-declaration including the forest principles, non-binding recommendations
- Agenda 21, non-binding Action Plan
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), binding
- RAMSAR - Convention on Wetlands, binding
- and other treaties in relevance for the programme.

It also includes a description of which donors that exists in the country.

2. Project/Programme description
Brief description of the present set-up of the programme:
a) description of the aims and activities of the project
b) geographical area
c) socio-economic and cultural context
d) stakeholder analysis including ethnic and gender relations, and also an assessment of stakeholders that were "excluded" from the project activities
e) institutional set-up including policy framework on biodiversity
f) programme activities.

3. Problem analysis
Analysis of biodiversity aspects within the programme, both historically (since inception of programme) and presently. The analysis should:

a) be made using the following documents as analytical tools:
- "Biological Diversity - guidelines for SIDA support for the sustainable use and conservation of biodiversity", SIDA, 1994
- "Sida and the Convention on Biological Diversity", Sida, 1998
- "Guidelines for Environmental Impact Analyses in development cooperation", Sida, 1998
- Sida's four action programmes
- "Strategic Framework" developed for the Biodiversity in Development Project (to be able to influence the BDP-process).

b) explicitly consider and comment on the full range of biodiversity issues in the project area, (e.g. evidence of irreversible losses, opportunities for improved use of biodiversity for human development, etc), to what extent biodiversity has been "mainstreamed", which biodiversity aspects that have been considered, and the relevance of these to the different stakeholders, how the aspects of biodiversity has been handled and from which stakeholders,

c) identify key constraints to improved biodiversity management and improved human development, and assumptions made about the links between the two, within the context of the project aims and activities

d) include assessment of whether project/programme successes have been, or are, sustainable (considering mainly aspects in connection to biodiversity use) in the long term (i.e. without further project input),

e) explicitly consider and comment on methods used for mainstreaming aspects of biodiversity into the project/programme, past and present monitoring of biodiversity aspects and tools to follow-up these aspects (environmental/biodiversity indicators).

Particular attention should be paid to the analysis of the projects impact on ecosystem services related to biodiversity, as well as the linkages between biodiversity and sustainable livelihood, culture and social relations (including ethnic, gender and age relations) and political and socio-economic structures. Also gene policy questions

(bioprospecting and eroison of domestic species, plants and animals, genetic diversity) should be analysed.

4. Institutional resources
Identification of and consultation with possible other institutions of importance, shall be done, that could be a resource for the programme (regarding biodiversity).

5. Lessons learned for the programme
The lessons learned from the mainstreaming of biodiversity for the project/programme planning and implementation, including field methods, shall be summarised and discussed.

6. Lessons learned for the Sida mainstreaming process
The lessons learned from the mainstreaming of biodiversity for project/programme planning and implementation, including field methods, shall be summarised and discussed.

7. Conclusions and recommendations for the programme
Conclusions and recommendations for the programme:
a) on methods for biodiversity mainstreaming within the programme
b) on follow-up mechanisms (monitoring including possible indicators).

8. Conclusions and recommendations to Sida
Conclusions and recommendations to Sida regarding:
a) improvements that could be made in the project/programme planning process and implementation of projects/programmes
b) improvement of the analytical tools and guidelines, see c) above, for mainstreaming biodiversity aspects within Sida-DNRE´s programmes.
c) methods for how aspects of biodiversity can be mainstreamed into projects/programmes.
d) how to monitor aspects of biodiversity in the programmes/projects (through environmental indicators etc).

3.2 Presentation of case studies in seminar/workshop
The case studies will be presented in a seminar/workshop at the Sida office in Stockholm in January 2000, and when possible in the country where the case study has been taken place. The case studies will also, if possible, be presented at the BDP regional workshops on case studies: Cameroon (28/6 - 2/7/99); Sri Lanka (24/7 - 30/7/99); Botswana (6-11/9/99); Peru (27/9-1/10/99).

4. Methods
The mainstreaming of aspects of biological diversity is of course dependent on the interest of the "owner" of the project/programme in extending the focus of the project/programme. The mainstreaming should be initiated in close connection with regular reviews of Sida's support.

The consultants performing the case studies will be responsible for developing specific methods for each case study, as a contribution to lessons learned, in cooperation with the recipient partner. The consultants shall try to coordinate the

activities in the case studies with the BDP, see also Terms of Reference for BDP case studies, appendix 2 .

The work on the case studies can be done in the following way:

1) Discussion and planning in consultation with programme officers concerned.

2) Planning of each study in consultation with the partner in cooperation, institutions of importance for the issue in the recipient country and consultants responsible for the implementation of each programme.

3) Implementation in consultation with, and preferably together with, the partner in cooperation and institutions of importance for the issue in the recipient country, if possible in the field.

4) Review of results in seminar form (and in a written report) in connection with annual reviews or suchlike, and also with the staff at Sida-DNRE. Discussion of results and recommendations for each programme.

5) The follow-up of the first mainstreaming studies should take place after approximately one year, in connection with the normal follow-up of the programme. At this point in time the methods can be evaluated and further inputs to the analytical tools and guidelines can be made. From our own results and from the BDP results, further recommendations can be made on how the work of mainstreaming aspects of biodiversity can be continued in other projects/programmes in the natural resources sector.

5. Time frame

The case studies, for mainstreaming of Biodiversity at Sida phase 1, DNRE, shall all be completed within the year 1999, although follow-up of the case studies and further lessons learned from them will take place during year 2000 and beyond.

6. Specifics regarding the Vietnam case study

6.1 Background

The Mountain Rural Development Programme (MRDP) is a broad rural development programme, based within MARD (Ministry of Agriculture and Rural Development) working in five provinces in the upland areas of northern Vietnam. The present phase of the (MRDP) covers the years 1996-2000.

Parallel with the activities with MRDP Sida is also supporting the National Environmental Agency (NEA) with technical support from IUCN. NEA has the national mandate to coordinate Biodiversity issues.

The programme consists of the five provincial projects and one central project designed to provide support services to the five provinces as well as building up the capacity of the Ministry of Agriculture and Rural Development (MARD) in policy and strategy formulation.

The main components of the programme are:

- land use planning and land allocation

- extension and applied research
- strategic research
- rural finances (savings & credits)
- market information and business development
- gender balance
- human resources and organisational development
- internal and external communication.

Practically all programme components include a range of issues. Extension for example, encompasses activities such as handing out high-breed varieties and fertilisers, establishment of demonstration plots, promotion of PRA and encouragement of village management groups.

Programme monitoring is based on a monitoring system specifically developed for MRDP, the so called MILS (Monitoring Information and Learning System). Through MILS, financial and activity monitoring are undertaken, whereas impact monitoring (environmental and socio-economic) only is undertaken to a limited extent.

Major efforts have been made by the programme to develop a relevant and viable environmental monitoring system during the last eight years. During the annual programme review in May 1998, between MARD and Sida, it was agreed that "an additional study, evaluating the environmental effects, may have to be necessary to enable the Programme to demonstrate achieved (environmental,… authors note) results for the planned Mid Term Review in April 1999." It was also agreed that MRDP should continue the efforts to "work out a simple and effective environmental monitoring system as part of MILS" (quotes are from the Agreed Minutes from the Annual Review, May 1998).

A process has therefore been initiated within MRDP to a) provide a framework for analysing the possible environmental effects of MRDP, and b) based on the analysis make suggestions on what environmental impacts to monitor and how this monitoring could be undertaken. A preliminary environmental analysis has already been undertaken, and tentative suggestions made for environmental monitoring. These suggestions include e.g. improvement of the in-depth village monitoring using participatory techniques to identify relevant environmental effects and indicators.

Biodiversity is one of the components included in the environmental analysis, but will not be covered particularly in-depth. However, since the broader environmental analysis already is undertaken, there are many advantages of scale of selecting MRDP as one of the case studies for the biodiversity mainstreaming project, and explicitly aim at closely linking the case study to the general process of improving environmental monitoring within the programme.

6.2 Purpose and scope

The purposes of the case study will therefore be two-fold, and include both an opportunity of concentrating more on biodiversity aspects within MRDP per se, and the more general purpose of serving as an illustrative case study for learning about biodiversity mainstreaming, within Sida at large.

6.3 Tasks

Specific tasks, apart from the general ones specified above under 3.1, shall include:

1. An assessment shall be made for the last eight years and include the FCP-phase 1991-1996, and MRDP-phase 1996-2000. The brief historical overview shall include the whole period from initiation of the Bai Bang pulp & paper mill and onwards.

2. Identification and analysis of other on-going studies and work of relevance, by different institutions and other programmes in Vietnam.

3. Where relevant, include community-based indicators specifically on biodiversity, in the work with improving in-depth village monitoring part of MILS.

6.4 Methods

The study shall be undertaken through:

- consultations with programme officers concerned at Sida-DNRE
- close consultation and cooperation with MRDP
- identification of and consultation with other institutions of importance in Vietnam
- briefly going through back-ground material (including reports and studies of the Bai Bang and subsequent plantation programmes)
- working out a format for PRA-based in-depth village studies on environment with specific emphasis on biodiversity (linked to the general process of improving environmental monitoring within MRDP).

6.5 Time frame and reporting

A total of five weeks for the case study itself is required, of which two weeks for a field visit to Vietnam.

A draft report shall be presented by June 30, 1999. The consultant shall present the results in a seminar/workshop at the Sida office in Stockholm and also in Vietnam for NEA (National Environmental Agency), MRDP, CRES and others.

7. Specifics regarding the Orissa case study

7.1 Background

The project "Capacity Building for Participatory Management of Degraded Forests in Orissa, India" aims at developing the concept and understanding of Participatory Forest Management (PFM) that includes both joint and community forest management as a potential for sustainable use of forest resources in the state of Orissa. The understanding of PFM should be based on experience from Orissa Forest Department (OFD) and from the experiences of local initiatives to protect forest areas for sustainable production of timber and non-timber forest products (NTFPs).

The first phase of the project (Dec 1997 - May 1999) aims at developing a background and capacity for a longer support in the second phase. The outcome of

the first phase will be a proposal for continuation of the project, written by OFD but developed out of an understanding of PFM for sustainable utilisation of forest resources shared between OFD and NGOs and village level organisations (VLOs) active in the area.

The multiple goals of the first phase are:

1. Further elaboration of JFM and CFM concepts by exploring relationships between joint and community based forest management practices;
2. Strengthening the capacity, including restructuring, of the Orissa Forest Department;
3. Knowledge about low cost methods for reforestation through natural regeneration;
4. Use of the information and learning experiences generated during this period for the preparation of the project document for phase II.

7.2 Purpose and scope

The purpose of the biodiversity case study is to draw and present lessons learnt from the first phase of the project "Capacity Building for Participatory Management of Degraded Forests in Orissa, India", in particular regarding mechanisms for mainstreaming biodiversity aspects, which biodiversity aspects have been covered in the project and the relevance of these to the different stakeholders.

The study will present the format used in the project and proposed by the project for PRA-based village studies and monitoring on environment and biodiversity, including environmental and biodiversity indicators and with special emphasis on conclusions of relevance for other Sida-supported programmes.

The study will also make conclusions and recommendations, based on the experience from the project "Capacity Building for Participatory Management of Degraded Forests in Orissa, India", regarding improvement of the analytical tools and guidelines (see 3.1 c) for mainstreaming biodiversity aspects within Sida-DNRE´s programmes.

7.3 Methods

The study shall be undertaken through:

- studying the different reports from phase one of the project to draw lessons regarding to what extent biodiversity has been "mainstreamed", which biodiversity aspects that have been considered, the mechanisms for mainstreaming biodiversity aspects, and the relevance of these to the different stakeholders;

- consultations with programme officers concerned at Sida-DNRE;

- consultation with relevant project staff;

- consultation with other institutions of importance in India;

- studying other background material of relevance for the case study;

- presenting lessons learnt from the project, in particular regarding mechanisms for mainstreaming biodiversity aspects and the relevance of these to the different stakeholders;

- presenting the format used in the project and proposed by the project for PRA-based village studies and monitoring on environment with specific emphasis on biodiversity and biodiversity indicators.

7.4 Time frame and reporting

A total of two weeks are required for the case study. Since field work for mainstreaming of biodiversity aspects in the project has already been done by the consultant, including consultations with stakeholders (representing women and men from tribal groups, scheduled casts, open casts etc.) in twelve villages in Orissa, consultations with local and state level NGOs and with local and central OFD staff, no field work for this case study should be necessary. Necessary contacts in India should be possible to make through different forms of correspondence. A draft report will be presented by June 30, 1999.

The consultant shall present the results in a seminar/workshop at the Sida office in Stockholm and also if possible in India.

8. Regarding the other one to two case studies

The other one to two case studies are yet not elected but will be elected latest February 1999. They shall be finalised before December 1999.

Annex 2
Amendment to the Terms of Reference (Zambia)

Not available.

Annex 3
Data Collection Instruments

Data Collection Instruments

Policy level:	
Setting	How do you perceive the importance of biodiversity in relation to agricultural development?
	What actors are involved in policy setting?
	To what extent are donor requirements regarding biodiversity clear?
	What is your assessment of the impact of liberalisation on biodiversity?
	How are priorities for agricultural policy in general and the National Seed Policy in particular been set?
	Has the National Seed Policy been approved?
	To what extent does the National Seed Policy address issues of biodiversity and biosafety?
	To what extent have international treaties and conventions been considered in policy formulation (CBD, UPOV, Agenda 21, TRIPS, FAO International Undertaking on PGR and Action Plan for Conservation and Sustainable Utilisation of PGR, CITES, RAMSAR)?
	What is your assessment of the impact of past activities of FCSP on biodiversity?
	What are the prospects for the future regarding the impact of FCSP on biodiversity?
	To what extent have biodiversity issues been considered in project proposals?
	Have EAIs been carried out for project formulation?
	How is policy operationalised?
	What are constraints for the promotion/mainstreaming of biodiversity?
	What are the opportunities for the promotion/mainstreaming of biodiversity?
	What is your assessment of the roles of the different stakeholders in the seed sector (formal and informal)?
Control	How do you perceive the importance of biodiversity in relation to agricultural development?
	Does the National Seed Policy adequately cover all seed issues in particular regarding biodiversity and biosafety?
	What is the current thinking on plant breeders rights (public, private, NGOs, farmers)?
	What is the current thinking on biotechnology and biosafety (GMOs, terminator genes)?
	What mechanisms do you use for the enforcement of the National Seed Policy and the Plant Varieties and Seed Act (e.g. royalties, licences for inspection, certificates for seed)?
	How do you propose to maintain effective seed quality in the informal sector?
	What is your assessment of the impact of past activities of FCSP (your project) on biodiversity?
	What are the prospects for the future regarding the impact of FCSP (your project) on biodiversity?
	What are constraints to effectively to coordinate the seed sector?
	What are opportunities for coordination of the seed sector?
	How do you assess the possible conflicting roles of control and training being carried out by SCCI?
	What is your assessment of the roles of the different stakeholders in the seed sector (formal and informal)?

Research:	
Public	How do you perceive the importance of biodiversity in relation to agricultural development?
	What are the main considerations for biodiversity in crop development?
	To what extent are donor requirements regarding biodiversity clear?
	What are the implications of the international treaties and conventions to which Zambia is a signatory (CBD, UPOV, Agenda 21, TRIPS, FAO International Undertaking on PGR and Action Plan for Conservation and Sustainable Utilisation of PGR, CITES, RAMSAR) for your activities?

	To what extent have you incorporated local genetic resources into your crop development program?
	Who are the active stakeholders in setting priorities, planning, implementation and evaluation of research?
	How conversant are the active stakeholders with biodiversity issues?
	What is your assessment of the impact of past activities of FCSP (your project) on biodiversity?
	What are the prospects for the future regarding the impact of FCSP (your project) on biodiversity?
	Does the National Seed Policy adequately cover all seed issues in particular regarding biodiversity and biosafety?
	What is the current thinking on plant breeders rights (public, private, NGOs, farmers)?
	What is the current thinking on biotechnology and biosafety (GMOs, terminator genes)?
	What is your assessment of the roles of the different stakeholders in the seed sector (formal and informal)?
Private:	How do you perceive the importance of biodiversity in relation to agricultural development?
	What are the main considerations for biodiversity in crop development?
	Who are your main clients?
	What are the implications of the international treaties and conventions to which Zambia is a signatory (CBD, UPOV, Agenda 21, TRIPS, FAO International Undertaking on PGR and Action Plan for Conservation and Sustainable Utilisation of PGR, CITES, RAMSAR) for your activities?
	To what extent have you incorporated local genetic resources into your crop development program?
	Who are the active stakeholders in setting priorities, planning, implementation and evaluation of research?
	How conversant are the active stakeholders with biodiversity issues?
	What is your assessment of the impact of past activities of FCSP (your project) on biodiversity?
	What are the prospects for the future regarding the impact of FCSP (your project) on biodiversity?
	Does the National Seed Policy adequately cover all seed issues in particular regarding biodiversity and biosafety?
	What is the current thinking on plant breeders rights (public, private, NGOs, farmers)?
	What is the current thinking on biotechnology and biosafety (GMOs, terminator genes)?
	What is your assessment of the roles of the different stakeholders in the seed sector (formal and informal)?

Gene Banks	How do you perceive the importance of biodiversity in relation to agricultural development?
	What are the main considerations for biodiversity in your programmes?
	What are the implications of the international treaties and conventions to which Zambia is a signatory (CBD, UPOV, Agenda 21, TRIPS, FAO International Undertaking on PGR and Action Plan for Conservation and Sustainable Utilisation of PGR, CITES, RAMSAR) for your activities?
	To what extent are donor requirements regarding biodiversity clear?
	What is your assessment of other stakeholders' perception and appreciation of biodiversity?
	How many accessions do you have and what is your collection strategy?
	What is your assessment of the present state of biodiversity in comparison to ten years ago?
	What is your assessment of the impact of past activities of FCSP (your project) on biodiversity?
	What are the prospects for the future regarding the impact of FCSP (your project) on biodiversity?
	Does the National Seed Policy adequately cover all seed issues in particular regarding biodiversity and biosafety?
	Is there sufficient support from policy makers in the implementation of the National Seed Policy as far as your activities are concerned?
	What is the current thinking on plant breeders rights (public, private, NGOs, farmers)?
	What is the current thinking on biotechnology and biosafety (GMOs, terminator genes)?
	What is your assessment of the responsibility of the different stakeholders in maintaining biodiversity in the seed sector (formal and informal)?
	How do you assess the ex situ conservation efforts (constraints and opportunities)?
	How do you assess the in situ conservation efforts (constraints and opportunities)?

NGOs	How do you perceive the importance of biodiversity in relation to agricultural development?
	What are the main considerations for biodiversity in your programmes?
	What are the implications of the international treaties and conventions to which Zambia is a signatory (CBD, UPOV, Agenda 21, TRIPS, FAO International Undertaking on PGR and Action Plan for Conservation and Sustainable Utilisation of PGR, CITES, RAMSAR) for your activities?

	What is your assessment of farmers' perception and appreciation of biodiversity? What about other stakeholders?
	What is your assessment of the impact of past activities of FCSP (your project) on biodiversity?
	What are the prospects for the future regarding the impact of FCSP (your project) on biodiversity?
	Does the National Seed Policy adequately cover all seed issues in particular regarding biodiversity and biosafety?
	What is the current thinking on plant breeders rights (public, private, NGOs, farmers)?
	What is the current thinking on biotechnology and biosafety (GMOs, terminator genes)?
	What is your assessment of the roles of the different stakeholders in the seed sector (formal and informal)?

Farmers	How do you perceive the importance of biodiversity in relation to agricultural development?
	What are the main considerations for biodiversity in your farming activities?
	What is your assessment of other stakeholders' perception and appreciation of biodiversity?
	What is your assessment of the present state of biodiversity in comparison to ten years ago?
	What is your assessment of the impact of varieties developed by the research system on biodiversity?
	What type of "wild" plants/crops do you use?
	What is the trend with regard to their availability?
	What is the importance of these wild plants/crops?
	What do you see as your role in managing and sustaining biodiversity?
	What are the prospects for the future regarding the impact of research on biodiversity?
	What is your assessment of the roles of the different stakeholders in the seed sector (formal and informal)?

Annex 4
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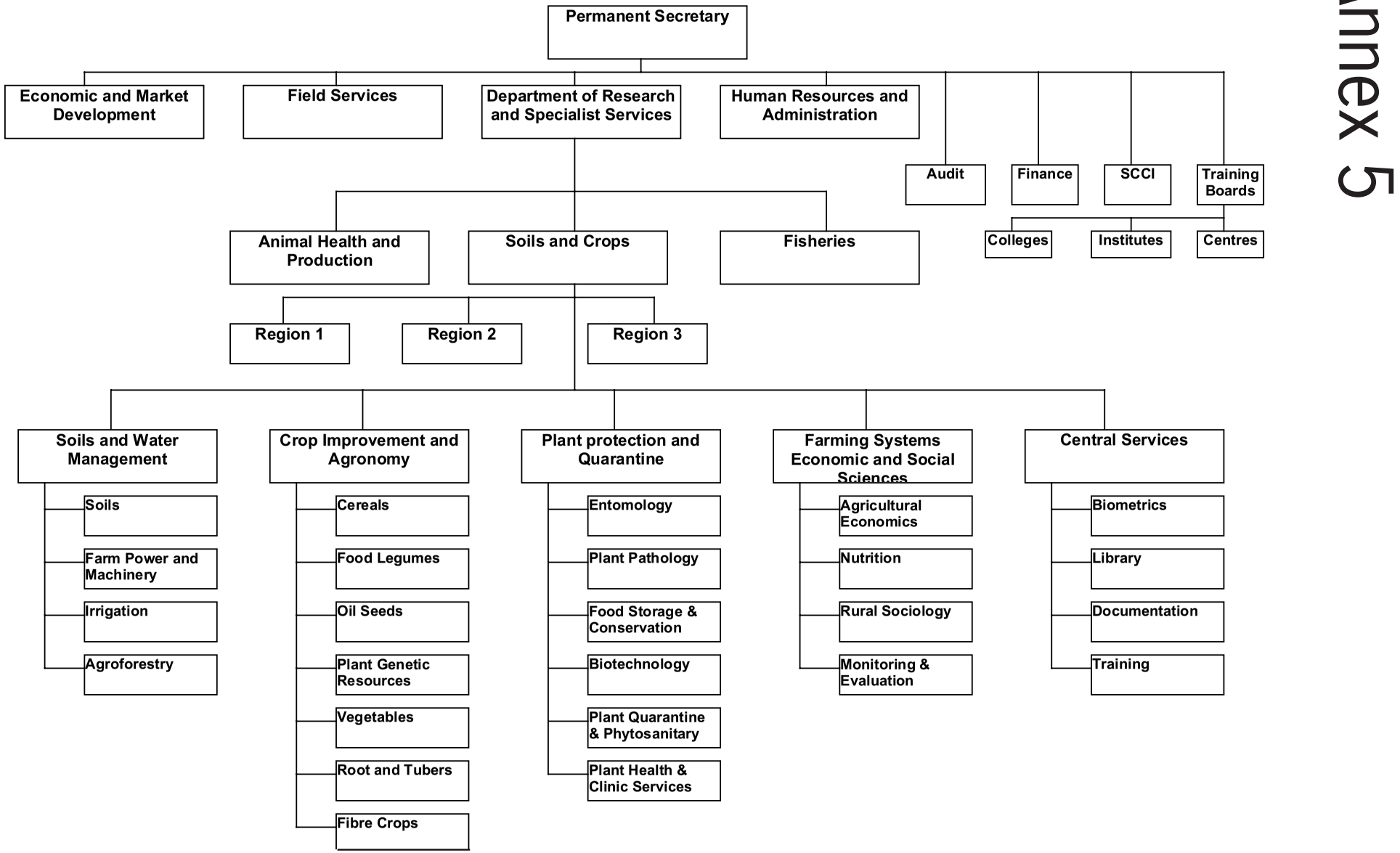
Annex 5

Organogram: Ministry of Agriculture, Food and Fisheries (Source: Chalabesa 1999)



Annex 6

Summary of Stakeholder Analysis in the Seed Sector

Stakeholder	Status	Major function	Main collaborating partners	Expectation of other stakeholders on future role
Public Sector:				
SCRB	Public research branch under MAFF responsible for crop improvement	Strategic and adaptive research, crop variety development and improvement, genetic resource management, variety maintenance and breeder seed supply.	ZAMSEED, MRI, SCCI, Field Services, NGOs.	SCRB should carry out applied and adaptive research in traditional crops not attractive to the private sector. In addition and strategic long-term research that the private sector is not willing to take up. SCRB should maintain germplasm of parental lines so as to safeguard national interest.
SCCI	Public institution under MAFF having authority on quality control and monitoring.	Seed law enforcement: independent variety testing, seed testing, seed inspection, variety registration, administration of plant breeders' rights. Advisory role including provision of training on seed quality issues. SCCI coordinates the activities of NGOs involved in seed related activities through the National Seed Multiplication Implementation Committee.	SCRB, seed companies, NGOs, GART, stockists, seed growers.	SCCI should continue to play its valuable role in seed quality control. However, MAFF is over-represented in the Variety Release Committee; moreover, the director of SCCI should not be the Chairman of the Committee. Committee meetings should be organised more on a regular than ad-hoc basis.
Field Services of MAFF	Public institution responsible for providing extension services.	Seed extension, dissemination and promotion.	SCRB, SCCI, NGOs, seed growers, seed companies.	
UNZA	Public training and research institute	Training in seed science and conservation and utilisation of genetic resources. Crop research	SCRB, SCCI.	
Private Sector:				
GART	Not-for-profit research trust.	Collaborative conservation farming, variety testing, variety trials, and dairy improvement. Demonstration of commercial farming.	SCCI, SCRB, seed companies, agricultural input companies (e.g. Lonrho, BASF), ZNFU.	GART, a valuable initiative to privatise research, should be complementary to SCRB. It should conduct applied research in crops with a high commercial value (e.g. maize, wheat, soybean, pastures, sorghum). GART could also test agricultural technology in general. Funding remains delicate for which different sources may have to be tapped: contributions from GRZ through levies on inputs; agri-business; land rent.

Stakeholder	Status	Major function	Main collaborating partners	Expectation of other stakeholders on future role
Maize Research Institute	Local private seed company.	Variety improvement, seed production, processing, distribution and marketing.	SCCI, SCRB, GART, seed growers.	
NGOs like PAM, CARE, WVI	Independent not-for-profit organisations involved in community work.	Food relief, drought rehabilitation, seed production and multiplication, seed extension, seed distribution.	SCCI, MAFF, Field Services, SCRB, farmers, seed companies.	Although NGOs play an eminent role in seed multiplication and distribution, especially in remote areas, their activities need to be better coordinated. Important is also to develop a framework for monitoring so as to increase the linkages with the formal seed sector whenever possible. Free or heavily subsidised donations of seed may distort the seed market. At present, sustainability seems to depend heavily on donor support. Training in seed quality management is a pre-requisite for the continuation of the informal seed sector.
Seed growers	Farmers producing seed "on contract".	Seed companies, SCCI, Field Services, SCRB, NGOs, farmer seed groups.		
Seed Co (Z) International	Private seed company linked to Seed Co Zimbabwe.	Seed production, processing, distribution and marketing.	SCCI, NGOs, seed growers.	
Sempro (Z) or Pannar Seeds	Private seed company linked to Pannar Seeds of South-Africa.	Seed production, processing, distribution and marketing.	SCCI, GART, NGOs, stockists.	
ZAMSEED	Private seed company with majority shareholding by Swedish organisations (52.5%) and the remaining part owned by Zambian government and non government organisations.	Seed production, processing, distribution and marketing. Variety maintenance.	SCCI, SCRB, GART, NGOs, seed growers.	ZAMSEED is to be developed into a full fledged seed company having its own research and development capacity for variety development. ZAMSEED has not been fully satisfying the need for the multiplication of traditional crops developed by SCRB. A considerable number of seed growers have opted for contracts with other companies due to problems with payment. This puts the issue of future seed quality guarantee, and thus, of financial sustainability of ZAMSEED.
ZNFU	National farmers' organisation.	Promotion and protection of farmers' interests.	GART, SCRB, SCCI, Field Services, ZAMSEED, MAFF, NGOs, seed companies.	

Annex 7
Elements for a Biodiversity Stakeholder consultative Process

As described earlier, (agro-)biodiversity represents a wide and complex field of aspects. Because not all aspects are relevant to all activities in a project, stakeholders involved need to be able to focus their efforts. Integrating the sustainable use and maintenance of biodiversity into planning, implementation and evaluation requires, therefore:

a. an overview of essential biodiversity aspects in the respective geographical setting;
b. an understanding of how the identified aspects relate with:
    1. the project goals and activities;
    2. the impact on the environment;
    3. social development indicators such as food security, poverty alleviation, gender and/or equity;
c. an identification of aspects relevant in the case of the particular activity or project;
d. a knowledge and understanding of how to operationalise the integration of biodiversity aspects at the project level.

The listing of (agro-)biodiversity aspects in the matrix below may serve to focus the identification of more specific aspects when planning a project. This planning process could make use of the screens as suggested in the report and may include:

a. making an inventory of stakeholders and their views, knowledge and interests (perception screen);
b. making an inventory of the relevant aspects (some of the aspects in the listing may not be relevant to a particular project) and their prioritisation (impact screen);
c. describing the trends (current and desired) for biodiversity (impact screen);
d. defining the commitment of the different stakeholders involved (responsibilities and roles screen);
e. defining a workplan including a description of the required change, the constraints and opportunities, timeframe and instruments to be used especially for monitoring and evaluation (instrument screen).

Based on the character of an intervention and its interaction with the environment, two different domains for projects can be distinguished: natural biodiversity and agro-biodiversity. For each of the domains, a range of relevant biodiversity aspects can be identified: this range is very wide and not all aspects may be relevant for all type of projects.

In the matrix, only a first rough listing of main aspects in the agro-biodiversity domain (particularly the crop biodiversity domain) is presented which needs further elaboration and structuring. A similar listing could be developed for the natural biodiversity domain.

The matrix may be seen as a starting point for the development of an information and decision making tool. It can be related to more elaborate information on the specific aspects, including suggestions for approaches and indicators to be used.

Proposed Matrix for Monitoring Agro-Biodiversity

Agro-Biodiversity Parameter	Perception/ Knowledge	Trend in Impact		Roles and responsibilities		Required change	Constraints	Opportunities	Instruments
		Actual	Desired	Actual	Desired				
Crop genetic diversity:									
Between crops									
Between varieties									
Within varieties									
Within time									
Within space									
Valuable genes									
Local reproduction and/or evolution									
Output:									
Production level									
Stability									
Value									
Ecosystems functions									
Associated agro-biodiversity:									
Pest and disease susceptibility									
Beneficial organisms									
Beneficial functions									
Other biodiversity:									
Non agricultural									
Other ecosystem									

Halving poverty by 2015 is one of the greatest challenges of our time, requiring cooperation and sustainability. The partner countries are responsible for their own development. Sida provides resources and develops knowledge and expertise, making the world a richer place.

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