

well managed, it can be a tool for nature conservation; if poorly managed, it can readily lead to overexploitation and biotic impoverishment.

In situ conservation of the hidden harvest will be essential in any long-term strategy to sustain it, complemented as appropriate by ex situ conservation. This approach allows genetic adaptations to environmental change; it allows local people to continue using, managing and modifying these genetic resources; and it allows the hidden harvest to remain a significant contributor to local income and food security.

Protected areas have a role to play in in-situ conservation of these resources but they must allow appropriate access to local and indigenous communities to make use of those resources. But much of these resources will also inevitably occur outside protected areas, and mechanisms, including the need for effective well supported local institutions, will need to be addressed for their management in such circumstances.

Future policies on access to biological resources must be built on an understanding of the humanised nature of "wild" resources and areas. Such policies must address conservation but also the use, ownership, control and benefit sharing rights for those communities which are knowledgeable about and have played a crucial role in managing these resources. The CBD, therefore, has a critical role to play in dealing with this issue.

INTRODUCTION

In discussions of agricultural biological diversity, attention is most often focused on the diversity of food crops in agricultural systems, who should have ownership rights over them and how they should be conserved. As a consequence, relatively little attention has been paid to the importance and significance of the multitude of non or semi domesticated plant and animal species which fall outside of such systems but which have significant implications for the maintenance of genetic and biological diversity, for the sustenance of peoples' livelihoods and for national economies.

Where they are discussed, they are usually described as "wild" species. But the implication of the use of the word "wild" is that these species occur largely independently of human activity or design, often in wilderness areas. This is a misconception and the term "hidden harvest" has been preferred by many as a more accurate description of these resources, in recognition of the fact that the value and importance of uncultivated resources to people's livelihoods are often hidden to outsiders and therefore overlooked. Failure to recognise this value is one of the greatest threats to the continued existence of the hidden harvest.

The Convention on Biological Diversity makes it clear that any strategy to preserve biological diversity on earth must not only address its conservation but must also promote the sustainable use of such resources and in pursuing both these objectives, must recognise the role that those most closely associated with biological diversity have and recognise their rights as stakeholders in the future of these resources.

These three objectives come into sharp focus when talking about the hidden harvest. The need to conserve the hidden harvest, for its intrinsic value but also as a vital element in the maintenance and development of domesticated crop varieties, animal breeds, and fish species, must be tempered by recognition of the very real importance that those resources themselves have on a day to day basis for the survival of those people who rely on them.

THE ROLE OF THE CBD

The importance of agricultural biological diversity within the context of the Convention on Biological Diversity (CBD) has been acknowledged from the beginning and it is not without significance that this issue is to be addressed in detail at the upcoming third Conference of Parties, ie early in the

life of the Convention. Amongst the many issues to be addressed on this topic, however, there is one that has been given only fleeting acknowledgement - the issue of "wild" food and agricultural resources.

In the Executive Secretary's briefing paper "Consideration of Agricultural Biological Diversity under the Convention on Biological Diversity" (Document UNEP/CBD/COP/3/14) there are only brief references made to the importance of "wild" resources for agricultural biodiversity and for food security, to the role that humans have had in maintaining those resources, to the threats that currently face those resources, and to what needs to be done to conserve them.

The recommendations of the paper of relevance to this issue are limited to a general recommendation for the development of technical guidelines for the conservation and sustainable use of agricultural biodiversity and for the need to consider the CBD's relations with the FAO, particularly the Global System for the Conservation and Utilisation of Plant Genetic Resources for Food and Agriculture discussed below. Recommendations from SBSTTA2 in Montreal on this topic were limited to a call for gap analysis work to be carried out to identify what needs to be done in relation to "wild" foods.

Perhaps it is too much to criticise the limited consideration of this issue by the Secretariat in what is after all only a briefing paper. "Wild" foods have been considered in more detail as part of the international process which recently culminated in the Fourth International Technical Conference on Plant Genetic Resources held in June 1996 in Leipzig, Germany and organised by the Food and Agriculture Organisation of the United Nations (FAO). The purpose of the meeting was to consider a Report on the State of the World's Plant Genetic Resources for Food and Agriculture and to adopt a Global Plan of Action (FAO, 1996). These documents were prepared through a participatory, country driven process, which included the preparation of 154 national reports and the holding of 12 regional and sub-regional meetings. The Conference itself was attended by representatives of 150 countries and the EU.

The FAO State of the World Report is the result of an unprecedented effort to review and assess the state of plant genetic resources in agriculture. It tries also to identify the causes of their erosion and to analyse the areas where action can be taken in order to conserve genetic resources.

The Global Plan of Action, the first such plan countries have ever negotiated, contains programmes and activities to meet the priorities identified in the State of the World Report and to fill in identified gaps. The Plan also aims to facilitate the implementation of Agenda 21 and the provisions of the CBD in this area and to make the FAO Global System more operational. It covers twenty key priority activities, grouped into four main categories.

Significantly one of these key priorities is the "Promotion of In Situ Conservation of Wild Crop Relatives and Wild Plants for Food Production". That section describes several key elements in the conservation and sustainable use of such resources including the need:

- * to create a better understanding of the contributions of these resources to local economies, for food security and for environmental health;
- * to recognise the role that protected areas can have in the conservation of these resources and to promote this as one of the functions of protected areas, while recognising: the need to broaden the participation of local communities in the management and planning of such areas; the need for access in such protected areas for those indigenous and local communities which rely on and have managed those resources; and the need to recognise the rights of indigenous communities to those resources;
- * to address the need for conservation and sustainable use of those wild resources which occur outside of protected areas, for planning which recognises that need, and for

encouragement to be given to local communities to conserve and sustainably manage them.

Other key priority sections of the Plan of relevance to the discussion of this issue are on "Ex situ Conservation", recognising the need for ex situ conservation to act as a complement to, rather than a supplement for, in situ conservation, and the need to consider mechanisms for "Promoting Development and Commercialisation of Under-Utilised Crops and Species".

The Conference agreed that the Global Plan of Action should be implemented as an integral part of the FAO Global System for the Conservation and Utilisation of Plant Genetic Resources in harmony with the CBD. The endorsement of the Global Plan of Action at the Leipzig Conference represents a fragile consensus, but an agreement nonetheless, and although not above criticism itself the Plan does provide an important framework for dealing with this issue. As ever, one of the major issues in its implementation will be money. In the words of Geoff Hawtin, Director of the International Plant Genetic Resource Institute (IPGRI), a consultative group on international agricultural research (CGIAR) that is a major player in formal sector research on genetic resources for food and agriculture: "There is now a global agreement on what needs to be done. Next we need a global agreement on how to do it and how to fund it."

The Global Plan of Action will need the full backing of the CBD if it is to achieve its very important aims. There is, therefore, a need for the CBD to recognise the importance of this issue and to recognise that it has a critical role to play in addressing and promoting the conservation and sustainable use of non and semi-cultivated species. To date, little attention has focused on this issue and there appears to be little understanding of the significance of these resources or of the complexity of issues that need to be addressed in relation to them. The conservation and sustainable use of these resources represents almost a microcosm of all that needs to be addressed under the CBD.

DEFINING THE "HIDDEN HARVEST"

Before proceeding any further, there is a need to clarify exactly what it is we are talking about - as an understanding of the nature of the subject matter is essential to addressing what needs to be done to preserve it.

In much of the official discussion of this topic and in documents such as the FAO Global Plan of Action and the Secretariat's papers on Agricultural Biodiversity as well as the recommendations which have come out of SBSTTA such food and agricultural resources are referred to as "wild" foods or "wild" crop relatives. But the implication of the use of the word "wild" is that these species occur largely independently of human activity or design, often in wilderness areas. This is not the case and use of the term "wild" can lead to a number of misconceptions about these resources and their habitats.

The term "hidden harvest" is preferred and is derived from the *Hidden Harvest* project, initiated by International Institute for Environment and Development (IIED)'s Sustainable Agriculture and Environmental Economics Programme to understand the importance of so-called wild resources to rural people and to develop practical methods to make this value more visible as a means of protecting those resources for rural people and for biodiversity generally (IIED 1995). Much of the information contained in this paper is derived from the work carried out on this project. The term is used here to refer to the often unrecognised multitude of undomesticated plant and animal species on which rural people rely for livelihood security.

As scientific understanding improves, there is seen to be no clear divide between "domesticated" and "wild" species: rather it is a continuum resulting from co-evolutionary relationships between humans and their environment (Kingdon, 1993). Much of "the wild" is shaped by people. Many species that have long been considered to be wild are actually carefully nurtured by people, albeit less intensively than those cultivated in their fields. The unfamiliarity, seeming chaos and

haphazard appearance of domestic gardens has led many western researchers to overlook the rich complexity of these production systems. In the same way, forests and other vegetation that extend from the immediate neighbourhood of settlements have been assumed to be self-regulating wildernesses rather than productive eco-systems which are the partial product of human design.

There is a need, therefore, to recognise that even in relation to these resources, farmers and local communities have often had a considerable role to play in their management and conservation.

A second misunderstanding that arises from references to "wild" in relation to these food resources, is that they are somehow limited in importance to so-called "primitive" hunter-gatherer societies. Anthropological and biological studies worldwide, whether in semi-arid, temperate or humid settings, on the plains or in mountain areas, show that hunting and gathering are integral components of the livelihoods of a wide range of agricultural peoples (Scoones et al). Contrary to popular opinion, there is no progressive evolutionary trend of "development" from hunter gatherer to small-scale settled agriculture and livestock keeping to intensive agriculture systems. Rather, livelihood strategies in many social, economic and ecological settings simultaneously encompass a wide range of activities, of which undomesticated resources are often an important component (IIED 1995).

Many rural people, therefore, regardless of whether their agricultural systems are predominantly pastoral, swidden, or based on continuous cropping, deliberately incorporate resources into their livelihood strategies collecting, using, selling and managing these resources, as well as experimenting with their cultivation and domestication, and as a consequence they are an inextricable part of many agricultural systems.

Box 1: The Worldwide Integration of Farmland and Wildland Resources

- Indonesia: complex home gardens in Java have been found to contain hundreds of species within a single village. A range of annual and perennial crops are grown together, complementing the main rice crop. There is several different types of garden; intensively managed home gardens, the village/forest gardens and the forest fringe gardens. The importance of wild foods increases in gardens towards the forest fringe.
- The Philippines: Home gardens are also important for experimentation with the new varieties derived from wild species. The Hanunoo traditionally considered over 1,500 plants to be useful and cultivated about 130 of these in their swidden fields.
- Botswana: The use of a diversity of species is not limited to forested areas. The agro-pastoral Tswana use 126 plant species and 100 animal species as sources of food.
- Brazil: A study of the agro-forestry systems of a Brazilian family living in the Amazon estuary shows how they harvest various native and exotic species from a house garden, managed flood plain forest and unmanaged flood plain forest. Within the managed area, some vines, shrubs and trees are cut. The unmanaged area contains economically important species such as the acai palm and rubber. Together these three zones provide fish, game, fruits, medicines, household items and oil seeds, not only for home consumption, but also for sale. With the cash, the family is then able to buy other staple goods.

Source: "The Hidden Harvest: The Value of Wild Resources in Agricultural Systems", IIED, 1995

A third misconception is that "wild resources" are found in "wild areas". Undoubtedly, some resources are found in wilderness areas, especially but not only in forests, and these are important to many rural communities - but the hidden harvest is found in many other places as well. These

resources may be widely found in disturbed sites associated with agriculture, such as field edges, valleys, erosion gulleys and pathways.

Within agricultural systems themselves, a great diversity of wild resources may be found in multi-layered, complex agro-forestry systems, found particularly in South East Asia, and home gardens. But wild resources may also be important in apparently simple mono-culture systems, such as rice paddies. The irrigation canals that are home to fish, snails, frogs and other animals are important sources of protein and other nutrients for people (Ali, 1989). Even pests, such as rodents and weeds, have important nutritional value in certain circumstances (Scoones et al).

IMPORTANCE OF THE HIDDEN HARVEST

The hidden harvest is important to many rural people at a local level for many reasons, not least to ensure long term food security. They are collected to improve diets, to tide people over in times of famine, to supplement income, to provide genetic material for experimentation, and to provide medicines, utensils, fuelwood, craft and building materials. (Although each of these uses are of importance and the discussion in much of the paper will apply to all these uses, emphasis is given to the value of the hidden harvest for food or agricultural purposes in keeping with the subject of this workshop). Areas containing these resources are often of significant cultural or spiritual importance as well. At a national level, the cumulative value of wild resources to local people can also be significant.

Importance for Food Security, Diet and Health

Non domesticated plant and animal resources can be particularly important for food security, providing an important buffer during certain seasons and/or major periods of stress, particularly to vulnerable groups such as women, children and the poor. The hidden harvest provides insurance against crop failure, pest attack or drought because they can replace some of the lost crops. Many such foods have an advantage over cultivated crops in that their seeds can germinate and grow under drought conditions.

During such times local people not only rely more heavily upon the usual forest resources such as wild vegetables, berries, nuts, fruits, and insects but also on those undomesticated foods which require extensive processing before consumption. In West Africa, famine foods include roots, rhizomes, tubers, bark, buds, gums, leaves, flowers, fruits and seeds (Irvine, 1952). Such a variety also exists in Rajasthan, India, where 25 famine foods have been described including grains, fodder species and the desert locust (Bhandari 1974).

Even when there is no actual drought, the appearance of many wild foods may coincide with the hungry season which precedes crop harvests. At these times farmers may depend on such foods to replace the missing nourishment of staples and to provide the necessary energy to harvest their fields (Campbell, 1987; Longhurst, 1985).

Uncultivated foods are part of the diets of some households on a daily basis, not just during periods of food shortages. Many such foods have distinct nutritional benefits and can have higher fat, protein, mineral and vitamin content than cultivated species. The Green Revolution has been successful in increasing world supplies of staple food crops. However, the increase in carbohydrate-rich staples alone does not ensure nutritional well-being. Many poorer people lack access to marketed staple crops and draw on the hidden harvest for supplementation. It is access to a wide range of wild foods and resulting dietary diversity that contributes to nutritional well-being for these people (IIED 1995).

Significantly, women can be the most knowledgeable community members about the properties, management and processing requirements of these species. During the 1984-1985 famine in the Sudan, for example, the female headed households were better off than those headed by men because women were more knowledgeable in the collection of such foods (De Waal, 1989).

If anyone bothered to ask them, children would also value these foods highly, as their foraging activities provide them with essential supplies of fats, proteins, vitamins and minerals.

Despite all the progress in synthetic chemistry and biotechnology, plants also remain an indispensable source for medicine. Hundreds of species are recognised as having medicinal value, and many of these are commonly used to treat and prevent specific ailments and diseases. At least four out of every five of those plants are collected from the wild, most from the floras of developing countries. (Srivastava et al. 1995). WHO estimates that approximately 80% of the developing world's population meet their primary health care needs through traditional medicine (Bannerman, 1982, cited in Srivastava et al. 1995)

Box 2: Importance of Wild Species for Subsistence and Cultural Values

- Bushmeat is a major source of protein consumed in Africa, e.g., 75% in Liberia (Anstay 1991), 50% in urban areas of Equatorial Guinea (Fa et al. 1995), and an estimated 17.2 kg/person/year in Gabon (Steel 1994).
- The half million residents of the state of Amazonas in Brazil annually hunt and consume at least 3 million mammals, 0.5 million birds, and several hundred thousand reptiles (Robinson and Redford 1994).
- In Sarawak, Malaysia, the annual harvest of wild meat has been estimated at 18,000 metric tons, an average consumption of 12 kg/person (Caldecott 1988).
- Ninety percent of fishery landings in tropical developing countries come from shallow coastal waters, providing 40%-95% of animal protein consumption (Holdgate 1993). In Asia, over 1 billion people depend exclusively on fish for their protein requirements (Lunden and Linden 1993).
- In 1991 in the USA, one in five adults went fishing, and nearly 1 in 13 went hunting (USDI 1993).
- Berries and mushrooms are a staple in the diet of many Nordic people. In Finland, 16 species of wild berries are picked, with over 50 kg/person/yr harvested in some regions, and 30 species of mushrooms are eaten, with 68% of all households engaged in collecting them in one region (Salo 1995).
- Seventy to eighty percent of Africans consult traditional medical practitioners and use medicinal plants for health care (Cunningham 1993).
- In one study of sal forests in West Bengal, India, 155 of 214 species recorded were used by local communities for food, fuel, fibre, fodder, medicine, construction, household articles, religious use, ornamental use, or recreation (Singh et al. WWF case study).
- Some 3 billion people depend on fuelwood for energy, and in developing countries fuelwood supplies 20% of all energy needs (Sharma et al., 1992).

Source: WWF Discussion Paper: "The Commercial Consumptive Use of Wild Species: Managing it for the benefit of Biodiversity" (1996)

Economic Values

The hidden harvest can have significant economic value at both a local and national level. These resources represent ready sources of income to cash poor households and they provide a significant proportion of total household incomes, particularly where farming is marginal.

Many uncultivated resources have significant economic value by preventing the need for cash expenditure, and income derived from the collection and sale of these resources is particularly important for the rural poor as a source of cash for the purchase of other goods, for education or for emergencies. In some cases, collection, home use and marketing of wild resources can represent a better option than wage labour or farming. In Venezuela, for example, the Huottuja Amerindians net 30% more for the sale of wild palm trees than if they had spent the same amount of time working as wage labourers (Melnyk, 1994). In parts of Botswana, where unpredictable rains make farming a risky business, basket making from the wild palm and beer brewing from wild fruit provide a more secure income source, especially for women (Bishop and Scoones, 1994). In addition, the consumption of wild foods and cultivated fruits often saves money by reducing the necessity to buy food.

The hidden harvest can have particular significance for particular sectors of society. In many societies, wild resource, collection, management, harvesting, processing and sale are activities carried out predominantly by women. In these cases they can provide a vital source of personal income for women, enabling them a degree of independence within a household. Poor women in Uttar Pradesh in India derive almost half their income from plants found on the commons, compared with middle class women for whom the figure is one-third, and men who gain only 13% of their earnings from this source (Bell, 1995).

Box 3: Significance of the Hidden Harvest in local, national and international economies

- In the upper Tahuayo River Basin of Amazonian Peru, market sales of fish, game meat, timber and nontimber plants accounted for 56% of income compared to 44% from agriculture (Bodmer et al., WWF case study).
- Nontimber forest products account for 55% of total income for forest fringe dwellers in West Bengal, India (Singh et al., WWF case study); nationally, their estimated value exceeds \$1 billion annually (Poffenberger 1990).
- The value of bushmeat passing through formal markets in Gabon is estimated at \$3 million, and the value of rural consumption is estimated at \$21 million (Steel 1994).
- In Tanzania, the estimated value of wild resources to local people, for subsistence consumption or sale, was more than \$120 million in 1988 (IIED 1995).
- In 1986, Indonesia earned \$134 million from exports of rattan, resin, essential oils, kapok, and chinchona bark (quinine)(Sharma et al. 1992).
- In 1991, recreational fishers spent \$24 billion and hunters spent \$12.3 billion in the USA (USDI 1993).
- International trade in wild flora and fauna (excluding timber and fisheries products) is estimated at more than \$10 billion annually (Hemley, 1986).
- Global revenues from fishing exceed \$70 billion per year (Sissenwine and Rosenberg 1993).
- Total annual exports of logs and wood products in the world market were estimated at \$68 billion during 1986-88. Within the economies of developing countries, the forest sector's gross contribution is \$100 billion (Sharma et al. 1992).

Source: WWF Discussion Paper: "The Commercial Consumptive Use of Wild Species: Managing it for the benefit of Biodiversity" (1996)

The Value to Genetic Diversity

Even those plants which have no direct value as a food or other resource may have a genetic relationship to cultivated plants which makes them valuable "banks" for certain genes. Genes from non cultivated plants and animals have been the source of agricultural innovation for centuries, and will continue to be so. For instance, wheat, rice, maize and barley, which make up almost 90 per cent of global production of grain, all benefitted from improvements from wild genetic resources. The same applies to root crops, oil crops, vegetables and pulses, fruits and nuts and commodity crops. Without wild sugar cane genes, there would probably not be a viable sugar cane industry anywhere in the world (Scoones et al 1992).

Wild genetic resources are often a useful source of genetic adaptation to ecological change. Wild relatives that can cope with uncertain and variable environmental conditions found in natural environments may be more suited to new conditions. As agriculture must increasingly be practised in marginal lands, in areas of degraded and disturbed soil and in cleared forest areas, wild crops characterised by fast growth, low soil water and nutrient requirements may become increasingly significant. Global climate change may also put new pressures on existing crops. Wild relatives that can cope with variable environmental conditions may be better suited to such conditions (IIED, 1995).

Cultural and Non-use Values

Finally, a fourth category of value includes the various intangible or non-use benefits derived from these resources, which may be of extreme importance locally. The cultural or spiritual value of some of these resources can sometimes be considered more important than monetary value. For instance, many rural communities designate certain resources or areas as sacred. Parts of forests may be protected as sacred groves because they are thought to be inhabited by spirits. Often these spiritual values are inextricably tied up with the function that a resource may provide in maintaining the health of the ecosystem.

Many plants and animals that are part of the hidden harvest have cultural significance for local people. Fonio, for example, has a central place in the cosmogony of the Dogon people in Mali and the same plant is of such socio-cultural importance in the life of the Koniagui of East-Central Senegal that an annual celebration is held in its honour (Scoones et al, 1995).

Another type of value consists of the many indirect benefits afforded by these resources, such as the pollination provided by bees and bats for cultivated crops and orchards, their contribution to water retention and rainmaking, and to prevention of soil erosion.

THREATS TO THE HIDDEN HARVEST

Overlooking the Value of the Hidden Harvest

The value and importance of uncultivated resources to people's livelihoods are often hidden to outsiders and therefore difficult to quantify. Failure to recognise this value is one of the greatest threats to the continued existence of the hidden harvest, and to its vital role in local livelihoods.

The value of these resources is hidden in part because many resources present particular methodological challenges for economic assessment:

- They are often highly site specific and seasonal, particularly in the case of plant resources, and their importance differs from one social group to another;
- they are often collected opportunistically and sometimes illegally, making harvest assessments difficult;
- they are often marketed through informal networks or used as subsistence products and so do not have a formal market value; and

- they often represent a value to local people which cannot be translated into financial terms.

All these complexities make it extremely difficult for economic valuations to capture fully the importance of the hidden harvest to local people and to make this useful for policymakers. Thus, forests have been assessed simply in terms of their timber value, arable lands only in terms of the major crops, and wildlife areas only in relation to conservation and preservation objectives. It means that so-called "wastelands" are often converted to commercial uses such as industrial plantations or that high external-input agriculture displaces more diverse traditional agricultural systems, or local people are denied access to their traditional resource-collecting sites within protected areas. All of these can have implications both for people's livelihoods and for the maintenance of genetic and biological diversity.

Agricultural Intensification and the Hidden Harvest

The importance of wild resources in rural people's livelihood strategies is not reflected in most modern programmes of agricultural research and extension, which remain focused on increasing the yields of the main commodity and food crops through the use of external inputs. As traditional agroecosystems are simplified and cultivated areas expand, the availability and use of the hidden harvest has diminished. The loss of these resources can reduce communities' food security by reducing the variety of available foods and potential income sources. The dependence on a narrow range of species increases vulnerability to disasters such as pest attack, crop disease or drought. Loss of resource diversity may also mean less available genetic diversity for future agricultural adaptation (IIED, 1995).

The promotion and even imposition of improved varieties of crops has forced many farmers to abandon their traditionally diverse systems and adopt new technological packages (Pretty, 1995). This has sometimes shifted certain farming responsibilities from women to men, further disenfranchising women who usually have the greatest knowledge about the use and management of wild resources and their integration into farming systems (Salazar, 1992). The shift to the new technological packages often requires farmers to invest more time in agriculture. This may reduce their own time for experimentation with wild resources.

The increased use of pesticides associated with high-input agriculture affects the hidden harvest by killing off "pests" or "weeds" which may form an important dietary or financial component of livelihood strategies (Pretty, 1995). Fertiliser inputs increase the vigour and dominance of commodity crops, as well as some pervasive weed species, at the expense of the diversity of useful species at the field edge and amongst the crops.

As a consequence, the considerable wealth of indigenous knowledge that exists on the uses and management of the hidden harvest is being rapidly lost from one generation to the next as these resources fall into disuse, in favour of a limited number of improved varieties.

This may make people vulnerable at times when crops fail or drought strikes and also has implications for the future reservoir of knowledge about useful genetic material. An increased dependence on commodity crops, and the inputs these need, makes farmers vulnerable to price fluctuations. A diverse cropping system which includes access to wild resources can provide a buffer against the vagaries of local and international markets.

The Consequences of Restricted Access to Protected Areas

Despite the fact that protected areas have long been considered the best means of preserving areas rich in biodiversity, a role recognised by the CBD, it is increasingly recognised that problems arise when the establishment of a protected area does not recognise the role that some of the biodiversity in that area can play in contributing to local people's security of livelihoods nor, in such instances, the important role local management and land use practices can often have in sustaining and protecting that biodiversity.

Protectionist approaches to biodiversity conservation, through draconian protected area legislation which restricts access by local people to their traditional resource-collecting areas, cannot only damage local livelihood security, but can, in some instances, also result in degradation to the very ecosystems the legislation is designed to protect. Lack of livelihood security ultimately undermines conservation objectives as poverty and rates of environmental degradation intensify in the land around protected areas. Legislation which restricts access to traditional lands changes the status of hidden harvest collectors to illegal poachers or trespassers, often resulting in unsustainable exploitation as a consequence. Open protests have become common in many countries, again threatening the viability of such areas.

On a technical and logistical level, maintaining such areas is financially expensive, and therefore difficult to sustain for the financially-burdened governments of many developing countries. Expenditure on protected areas can be high in national terms, for example consuming 0.45% of the total government budget for Tanzania compared with only 0.15% in the USA (Adams and McShane, 1992). These funds are often highly dependent on outside help and therefore subject to the vagaries of international aid policies (Pimbert and Pretty, 1995). A large proportion of these budgets are for policing activities.

Recent evidence also shows that, depending on the nature of the biodiversity concerned, excluding local people from biodiverse areas can actually result in a loss of biodiversity, as people's activities are often instrumental in maintaining the balance necessary for maximum biodiversity to flourish (Potkanski, 1994; Pimbert, et al. 1996).

Keoladeo National Park in India, for example, is a Ramsar site of international importance for its wetland ecosystem. For centuries local people grazed their buffaloes inside the park until grazing was banned in the 1980s. The villagers were adamant that as well as being an important part of their livelihood strategies, the grazing was an important form of ecosystem management, especially as it helped to keep down "weeds". After further research into the issue, it was concluded that "the traditional primary consumers of the wetland of the park, the buffaloes, should be brought back to control the unchecked growth of *Paspalum distichum*" (Bombay Natural History Society, 1991). Yet grazing remained banned (Pimbert et al. 1996).

So what needs to be done to ensure that the biodiversity represented by the hidden harvest is conserved and used sustainably?

ADDRESSING THE THREATS

The Convention on Biological Diversity makes it clear that any strategy to preserve biological diversity on earth must not only address its conservation but, recognising limitations on the ability to conserve all biodiversity, must also promote the sustainable use of such resources and in pursuing both these objectives, must recognise the role that those most closely associated with biological diversity have and recognise their rights as stakeholders in the future of these resources.

These three objectives come into sharp focus when talking about the hidden harvest. The need to conserve the hidden harvest, for its intrinsic value but also as a vital element in the maintenance and development of domesticated crop varieties, domestic animal breeds, and fish species, must be tempered by recognition of the very real importance that those resources themselves have on a day to day basis for the survival of those people who rely on them.

As has been stated, the failure to account for the costs of environmental change is a major factor behind the design of inappropriate natural resource management policies. Addressing the threats to the hidden harvest will involve consideration of issues such as increasing the visibility of its value and capitalising on that value through appropriate and sustainable use of these resources and addressing mechanisms for appropriate in situ conservation of those resources, both within and outside protected areas, and acknowledging the complementary role that ex situ conservation can have.

Local Level Valuation

There is a need to make the value of the hidden harvest more visible to provide better information for policy makers and other stakeholders, thus increasing the likelihood of more appropriate policies and plans. Creating a viable alternative to environmentally destructive activities, such as ranching and monoculture agriculture, through the sustainable use of such hidden harvests can encourage their conservation. A comprehensive assessment of value will also help communities realise the incentives to be derived from the sustainable management of wild resources, and can catalyse the design of effective local management structures (IIED, forthcoming).

Estimating the total economic value of the hidden harvest is not easy, and few studies have attempted this. Moreover, the real economic importance of wild resources cannot be fully captured simply through a narrow measure of their financial or commercial significance. Understanding the complexity of local use of biodiversity often requires a local focus of study based on local perspectives. Local perspectives are essential if policies are to increase, or at least maintain, existing resource values. Local valuations are able to deal with the difficulty of wild resources being highly site specific and seasonal. As their importance differs from one social group to another, seeking local level information will avoid the pitfalls of generalising information about a landscape, the use of its resources, and the value of its harvests for local livelihoods.

Greater local understanding of present or potential values may also help improve local resource management systems. This, in turn, can increase the value of the landscape and the viability of local livelihoods. These types of valuation can also provide the information needed for local people to negotiate resource use with more powerful external interests that are threatening the sustained use of these resources. Valuation studies can therefore be an important tool for the sustainable use of the hidden harvest.

IIED's Hidden Harvest project has outlined a local-level approach to valuation which assesses the economic importance of wild resources, while addressing some of the above concerns. The approach combines economic principles and methods with those of participatory rural appraisal (PRA). PRA provides an approach to natural resource appraisal and planning which recognises the importance of local people's understanding of their environment. The approach combines a range of flexible and adaptive interviewing and diagramming methods. The emphasis is on learning and planning with communities, rather than on extractive data collection for use by researchers external to the community. One of the key principles of PRA is to seek diversity, rather than to generalise about situations. The methods and processes involved reflect this principle, and make the approach invaluable for understanding the myriad values of natural resource use at a local level.

This local-level approach to valuation has been tested through a number of case studies (see Bishop and Scoones, 1994; The Hot Springs Working Group, 1995; Eaton and Sarch, forthcoming; and Collins and Guijt forthcoming), revealing that the methodological contrasts between economics and more participatory approaches can be complementary when attempting to value wild resources. Economic techniques can provide the concise conclusions and rationale needed by policy makers, while the participatory methods provide complementary information about temporal and spatial variations, about socially differentiated use and access to resources, and about the elusive non use values that economists find difficult to incorporate.

Such studies highlight the importance of policy measures that ensure that hidden harvest values are more fully taken into account during planning exercises such as resettlement schemes and need to become much more widely used, and should be incorporated into relevant disciplines such as environmental impact assessment, environmental economics, natural resource planning and agricultural research and extension.

Box 4: A Valuation Case Study

A Hidden Harvest case study was conducted in two villages in eastern Zimbabwe. A variety of methods (participatory mapping, farm transects, historical time lines, seasonal calendars, role plays and ranking and scoring) were combined with the economic valuation technique of derived demand to assess the total value of savanna woodland to local people. The derived demand approach uses prices of goods produced from natural resources to derive the value of unprocessed forest resources. For example, if a pole sells for \$2 and the costs of production are \$0.50, then the value of the pole as part of a tree standing in the forest may be derived by subtracting the costs of production from the end product price, thereby yielding a value of \$1.50. Using this approach, firewood was valued at Zim\$17,000 - 25,000 per year for each village. However, this represented only part of the total value of the woodland resource.

PRA methods were able to complement this by eliciting the values for which there is no financial equivalent. For example, role plays and scoring exercises revealed a total of 19 values, many of which have no market value, such as water retention, aesthetics, camouflage, prevention of soil erosion, and windbreaks. Groups of local women and men ranked all the different woodland values, giving many of the non market values a higher score than firewood. The importance of woodland in providing water resources and rainfall was particularly highlighted, especially in the light of a recent drought. The women noted that without rainfall, other products such as wood and fruits cannot be produced. For this reason they ranked water retention and rainmaking highest of all. This suggests that the total economic value of the resource is many times higher than the monetary figure obtained through the derived demand approach. The undervaluation of the woodland resource has been a recurrent issue in land use policy in Zimbabwe.

Bradley and McNamara 1992, cited in Scoones, 1995

Commercialisation and Sustainable Use

It is a short step from increasing the visibility of, particularly the economic, value of the hidden harvest to seeing the increased promotion of its commercial use as an important element in the conservation of those resources. Indeed the CBD Secretariat paper explicitly recognises this (at paragraph 82) and this is echoed in the Global Plan of Action which has as one of its key priorities "Promoting the Development and Commercialisation of Under Utilised Crops and Species", as a means of contributing to food security, agricultural diversification, income generation and conservation.

The key to such a strategy will be to ensure that any such commercialisation is accompanied by sustainable management strategies. But the sustainability of wild food use has received relatively little attention and what constitutes sustainable harvesting levels of different plant and animal populations remain largely unknown. What is clear is that such commercialisation presents the proverbial double-edged sword for conservationists. If well managed, it can be a tool for nature conservation; if poorly managed, it can readily lead to overexploitation and biotic impoverishment.

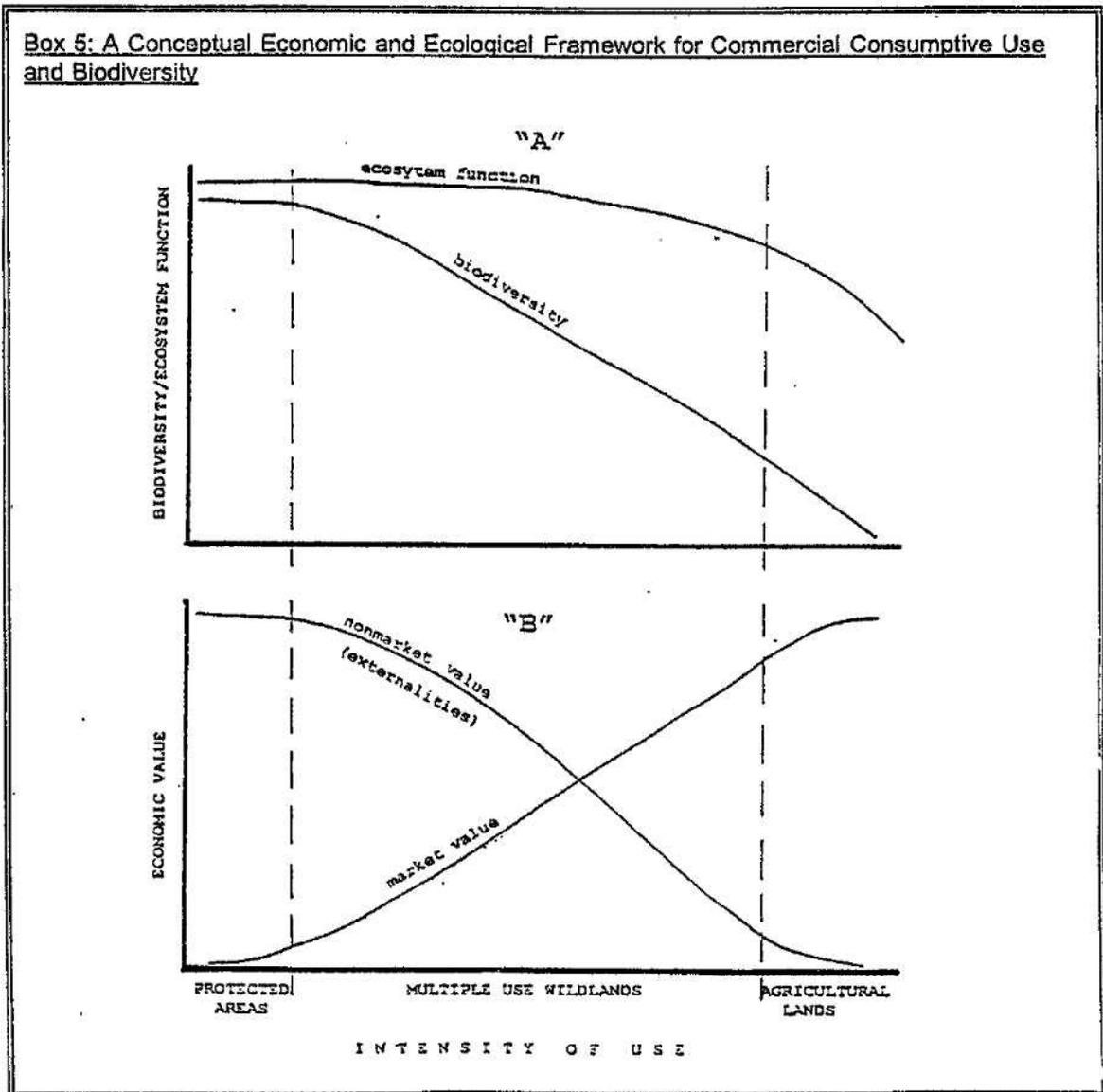
There needs to be recognition that human intervention in an ecosystem for commercial purposes inevitably alters and generally simplifies, at some scale, ecosystem structure, composition and function. Thus, commercialisation of wild resources may lead to a measure of biotic impoverishment and loss of "naturalness" of those same wildlands due to human use. However, the conservation value of commercialisation can be found in the fact that a policy of non-use will often lead to even greater biotic impoverishment as wildlands are converted to other land uses that yield greater economic returns.

Even if relatively well managed, however, it is unwise to expect commercial use to shoulder the full burden for biodiversity conservation. First, overreliance on commercial values alone, while ignoring

the other biodiversity-based and non-use values already discussed, may fail to offset the opportunity costs of alternative uses of the land. Second, even if commercial use revenues do offset such opportunity costs, specialization in commercial products may entail substantial trade-offs in biodiversity in the wildland under management.

There is not the opportunity in this paper to consider in detail issues related to the sustainable commercial use of wild species but the matter is addressed comprehensively in a recent WWF discussion paper entitled "The Commercial Consumptive Use of Wild Species: Managing It for the Benefit of Biodiversity" (WWF, 1996)

In that paper, a conceptual framework for viewing the interaction of Commercial Consumptive Use (CCU) and biodiversity conservation in the overall landscape of resource use and management is presented and this is reproduced here (see Box 5).



The graphs present the effects that different intensities of use (including associated management regimes) of marketed commodities from both wild species and agriculture on a given unit of land will have for key ecological and economic variables. Commodity is used broadly to include any

product that is traded, no matter how small the scale of trade. In this framework, multiple-use wildlands occupy an intermediate intensity of use between fully protected areas and the agricultural landscape. It is the management of these multiple-use wildlands that is the focus of CCU, and where the most significant gains or losses in biodiversity conservation will be made over the coming decades.

The distinction between the three forms of land use is often more blurred than indicated by the vertical dashed lines. Some protected areas allow low levels of CCU, and agroforestry sites and shaded plantations of coffee and cacao may fall in a grey area between wild and agricultural lands.

Graph "A" shows that biodiversity within a given area, in general, will be greatest under no or low intensities of human use and management. (The exact shape of the individual curves is not important, but the overall patterns are.) Eventually, however, increasingly intensive management for commodities from both wild and domestic species begins to erode an area's biodiversity. Biodiversity continues to decline with greater intensities of use until we reach the full transition to monocrop agriculture (or aquaculture), where biodiversity reaches its lowest level. Meanwhile, because of the ecological redundancy of species, well-managed multiple-use areas and even agricultural lands experience more moderate declines in parameters such as nutrient cycling, efficiency of energy capture, and gross ecosystem productivity. If use becomes too intensive, however, these processes also significantly decline. Maintenance of ecosystem functions is important because it allows for increased production of commodities, including wild species products, from the ever-more-simplified landscape of intensive use.

Graph "B" illustrates the trade-off between commodity and noncommodity economic values as a function of intensity of use. The economic value of commodities increases under increasingly intensive use and management. Such marketable products are often the only recognized measure of economic value of a unit of land, particularly for the landowner, and thus the commodity value is often the same as the market value of the unit of land. Obvious exceptions to this are popular parks and reserves that earn sizeable revenues from nature tourism. The other line shows the value of the diverse and generally less visible noncommodity values of wildlands and biodiversity. In addition to nature tourism values, these are the public goods and services—e.g., watershed protection, carbon sequestration, option, existence, and bequest values—of biodiversity for which true markets do not generally exist. These values decrease as wildlands become biotically and ecologically degraded with increasing intensity of use. In economic parlance, the noncommodity value line could be considered the sum of positive and negative externalities of the land and its use. The sum may become negative as use intensifies.

The sum of commodity and noncommodity values at any given intensity of use theoretically represents the total economic value of a unit of land. The optimal economic use of that land should be defined by where the sum is greatest. Thus, the challenge is to keep that optimal level of use as far to the left as possible—to prevent the slide down the slippery slope of economic specialization. There are two potential economic means to do this: (1) Greatly diversify the array and value of wild species products that can be marketed from largely intact wildlands. (2) Diversify, increase the value or recognition of, and find ways for beneficiaries to pay (or landowners to be compensated for) the noncommodity benefits of wildlands and biodiversity.

The report expressly supports the conclusions reached by IIED in its work - that forces for ecosystem simplification largely emerge from one overarching factor—the dominance of economic values in decisions about land use. To keep land uses to the left side of the graphs, there is a need to find ways to incorporate into decision making those cultural and ethical values attached to nature for which no economic value can rationally be assigned.

The report goes on to list 15 Guidelines as a framework for managing CCU for the benefit of nature conservation, acknowledging that these need to be adapted to specific regional conditions and individual management situations. A highly summarised list of those Guidelines is included as Appendix 1 to this paper.

In Situ Conservation

In situ conservation of the hidden harvest will be essential in any long-term strategy to sustain it, complemented as appropriate by ex situ conservation. This approach allows genetic adaptations to environmental change; it allows local people to continue using, managing and modifying these genetic resources; and it allows the hidden harvest to remain a significant contributor to local income and food security.

There is an emphasis in both the Global Plan of Action and the Secretariat's paper on the role of protected areas in in situ conservation of the hidden harvest. But in situ conservation needs to concentrate not just in protected areas, but also in and around farmers' fields, in village woodlands and grazing lands, where many of the useful wild and semi-wild diversity is to be found. Thus whilst the role of protected areas needs to be addressed, so too do mechanisms for protecting the hidden harvest outside these areas.

(a) Protected areas

Protected areas have a vital role to play in the in situ conservation of the hidden harvest but there needs to be some revision of the manner in which that is to be achieved. The 9800 protected areas around the world already include a wide range of species of importance to agriculture, but this is generally an unplanned result of nature protection. In general the criteria for selecting protected areas have concentrated on features of outstanding beauty and interest, and examples of the diversity of eco-systems and its species, rather than on variation within the species. The Biodiversity Convention is explicit in recognising the need to conserve biodiversity at several levels: the eco-system, the species and the gene pool. But in practice, protected areas have been selected and managed with the first two levels of diversity in mind, not the third. Only a limited number of countries have conservation activities of direct relevance to agricultural biodiversity in protected areas.

However, this is beginning to change and IUCN is actively pursuing ways of integrating such concepts into the well-established procedures of conserving threatened species and managing protected areas. UNESCO, too, has recognised this need and its Man and Biosphere and Cultural Landscapes programmes have been integrating the conservation of wild crops and cultivars into its conservation activities. The Secretariat's paper recognises this and suggests that the COP work with UNESCO amongst others in developing a comprehensive programme for in situ conservation of agricultural biodiversity (paragraph 63).

Secondly, there is mounting evidence of the need to make local people partners in the management of some protected areas. Their vested interest in maintaining the area and its biodiversity can reduce conflict and cost, and their extensive knowledge, and traditional management structures can be assets in managing the resources sustainably. The CBD has given recognition to the fact that local communities have evolved customary practices that are compatible with the conservation and sustainable use of agricultural biodiversity. Indeed, the need to give legitimacy to such practices is articulated in Article 10(c) of the Convention which requires each Party to "protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation of sustainable use requirements".

WWF supports this approach. At the last Global Biodiversity Forum, immediately prior to the SBSTTA in Montreal, it presented a Position Statement reflecting its concern that there needs to be much greater recognition and emphasis on participatory models of protected areas which allow access to indigenous and local communities for sustainable use of wild resources and which, through appropriate Joint Management Agreements, encourage partnerships between these communities and protected area agencies in the design and management of protected areas. It also promoted the need for greater recognition to be given to the important role that protected areas established and maintained by indigenous and local communities themselves could play in biodiversity conservation. A slightly updated and revised version of this statement will be put before

delegates at this Conference of Parties.

Box 6: Conservation activities in Protected Areas in relation to Plant Genetic Resources for Food and Agriculture

- Germany is using its system of nature reserves as a basis for conservation of wild relatives of apples and pears.
- Bulgaria has a project under way on the *in situ* conservation of forages, crop wild relatives and medicinal plants, and the Czech Republic is planning such an activity.
- Turkey has recently initiated a project to conserve, *in situ*, crop-related wild relatives of cereals, horticultural and ornamental flower crops, medicinal plants and forest trees with support from the Global Environment Facility (GEF). The project will also serve to develop and implement a national strategy for *in situ* conservation, and test and develop a new approach for the conservation of genetic diversity of wild crop species.
- In Central Asia, *in situ* conservation for the protection of forest genetic resources of wild fruit trees and shrubs is currently being carried out in Protected Areas. Turkmenistan has 19 such areas covering over 1,000 hectares, Azerbaijan 15 covering 6,501 hectares, Kyrgyzstan 680 hectares.
- Israel has conducted pioneering research on *in situ* conservation strategies for wild emmer wheat. Based on the concept of "dynamic gene preservation" of interacting populations in the wild, the plants continue to interbreed, forming new genetic combinations, but the genes themselves are, for the most part, preserved as long as the overall system stays in equilibrium.
- *In situ* conservation sites for wild relatives of *Coffea* has been identified in Ethiopia.
- Sri Lanka has one of the oldest and most expensive networks of Protected Areas, extending over 14% of its land area. Wild plants targeted for *in situ* conservation include fruit-crop genetic resources; species with recalcitrant seeds; wild relatives of rice, legumes and spices; and medicinal plants.
- In Brazil, the Centro Nacional de Recursos Geneticos (GENARGEN) has established 10 genetic reserves to maintain timber, fruit, nut, forage and palm species, and wild relatives of crops such as cassava and peanut.
- In Mexico, genetically unique wild populations of a perennial maize, *Zea diploperennis* have been specifically targeted for conservation within a small section (10 hectares) of the Sierra de Manantlan Biosphere Reserve.

Source: FAO Report on the Status of the World's Plant Genetic Resources (1996)

If protected areas are to be one mechanism for the conservation of the hidden harvest then an issue that will need to be addressed in the establishment of any protected area is local people's traditional rights to the hidden harvest. The creation of protected areas should not serve as a mechanism for stripping local or indigenous communities of the right to recognition of their role as traditional owners and managers of these wild resources.

Increasing attention has recently been given to improving resource tenure rights for local people (IIED 1994; Larson and Bromley 1990; Poffenberger 1993; Western and Wright 1994; and various WWF case studies). This may occur through efforts to better legally define existing ownership, through outright transfer of ownership from the state to individuals or groups, or through the

issuance of usufruct rights for public land resources. Assigning resource rights to individuals or communities, it is argued, should provide a strong incentive for good resource stewardship. In much of the developing world the emphasis has been on communal management systems under some form of common-property ownership by local communities.

However, various factors can undermine the effectiveness of such privatisation for sound resource management and biodiversity conservation, and thus regulation, influence or assistance by government or other outside agencies that represent broader public interests is often necessary. The question is what balance to strike between local control, government oversight, and the role and influence of other stakeholders (e.g. NGOs, bilateral assistance agencies)?

Box 7: Traditional forest management in Nepal

A traditional system of forest guards, known as shingi nawa, existed until fairly recently in the Himalayas in Nepal. Each guard was selected by the community and had the power to enforce communal rules concerning the controlled use of forest resources and to supervise grazing and cattle movements. The job was taken very seriously and shingi nawa was a highly respected member of the community. A growing demand for firewood resulting from population increases, and an escalation of tourist activities, began seriously to affect the forest cover. In 1974, in an attempt to protect the forest, the government established the Sagarmatha National Park. Whole communities were relocated and new rules strictly enforced through a new system of government forest guards, undermining the authority of the shingi nawa. For example, park officials allowed villagers from one village to cut trees in areas that had been protected for religious reasons by another village. Degradation continued until a local sherpa, sensitive to the views of the local communities, became warden of the park.

After considerable discussion the importance of the shingi nawa system has finally been recognised by the park authorities, and now operates once again in every village in the park.

Source: Sherpa, 1993.

The devolution of planning, implementation, management, monitoring and evaluation of protected areas to villagers and low-income groups is a frontier that needs to be explored by modern conservation organisations (Pimbert and Pretty, 1995). In a few cases, this approach is already being explored. In two internationally important wetlands, for example, one in Pakistan and the other in India, participatory approaches have been used with local people and park management authorities to encourage joint approaches to conservation management. In both cases, effective protected area management had been hampered by the passive or active opposition of local communities living in and around these wetlands because of their views and needs being ignored.

Again in both cases, the participatory planning processes resulted in the villagers and park authorities being able to negotiate workable ways forward. The process revealed not only the villagers' understanding of wetland ecology, and their ability to identify problems, but also elicited a range of management options to reconcile the conflicting interests between local people and outside conservationists. Local people expressed a willingness to take care of the wetlands' ecology provided that their legal and traditional rights are recognised, and that they receive compensation for their losses. Moreover, the villagers developed management scenarios which contained ideas for building appropriate local institutions and resource user groups, and for strengthening existing ones (WWF, 1995).

Such new approaches imply major reversals in roles as well as changes in organisational culture, funding, staff skills and practice. External conservation institutions need to provide:

- support for the claiming by communities of legal rights to continue traditional use of natural resources in and around protected areas;

- assistance in developing national legal and policy frameworks that support tenure and usufruct rights, equitable distribution of benefits, and local management structures;
- space and incentives for pragmatic approaches that build on indigenous systems of local knowledge, natural resource use and locally recognised decision-making structures and initiatives;
- strong commitment to the institutionalising of participatory approaches and methods in conservation through the transformation of formal sector organisations and NGOs; and
- flexible, field-based staff training programmes in participatory methodologies for professional staff, an organisational culture in which it is safe to experiment and learn from mistakes, and appropriate rewards and incentives to encourage professional reorientation away from top down conservation interventions (Source: WWF, 1995).

Box 8

In May 1996, WWF adopted a Statement of Principles on Indigenous Peoples and Conservation, after extensive consultation with indigenous peoples organisations. For WWF, recognition of indigenous peoples' rights to lands and resources is the basis for ensuring their effective contribution to the conservation of biological diversity. It is also a precondition for appropriately addressing the issue of protected areas in indigenous peoples' territories.

(b) Outside Protected Areas

As noted, the hidden harvest is not just found in wilderness areas but also in a diverse range of more domesticated settings including agricultural systems, disturbed sites such as field edges, valleys, erosion gulleys and pathways, and in many village common lands. It is not realistic to expect that wild crop relatives can all be covered by protected areas in these instances. It is in regard to the conservation of these resources in these areas that IIED's Hidden Harvest project and WWF's work on Commercial Consumptive Use have particular relevance, particularly as they relate to the sustainable use of those resources.

(i) The Hidden Harvest in Community Property

Community property resources, often held and managed as common property but often subject to strict community rules as to use, are often an important source of wild resources, particularly for the poor, the young and women. It is precisely these groups who have least access to private assets in many societies. It is the poor, therefore, that are most adversely affected by changes in land use and tenure. For example, in India, community property resources provide 14-23% of the rural poor's income, rising to 42-57% in times of drought (Bell 1995). Despite this, common property resources shrunk by one-third to one-half over the past 30 years, mainly due to privatisation, which has had a disproportionate impact on the poor (Bell 1995). As in many other places, the privatisation of land has had many further negative effects in rural India. Crops grown on land converted to private arable land yields are poor and productivity may be lower than the total returns from harvesting the former community land. Changes have increased inequities within rural societies with disadvantaged groups ending up with reduced access to resources. Changed tenure has resulted in increased environmental pressure on remaining common property resources, resulting in the disintegration of traditional controls over resource use.

A detailed understanding of tenure relations is central to understanding patterns of wild resource use. Tenure of land, of particular resources, ownership differentiated by gender, age and wealth and the seasonal dimensions of resource access need to be assessed. Few studies have tackled the question of wild food resource access in such detail, although there is a growing body of literature on tree tenure issues.

In Latin America, Amerindian groups used to have common control over territories. However, as land was expropriated, many were forced to settle in reserved lands. With reduced access to forest resources, communities are no longer fully able to rely on wild food products and have increasingly to rely on purchased foods. Conversion of range land expropriated for wheat farming in Tanzania has threatened the livelihoods of Barabaig pastoralists as they have lost traditional access to wild resources, saltlicks and water. Further, forced resettlement in new areas results in the need to adapt to new food sources which might lead to over-exploitation of resources (Bell 1995).

Research shows that preserving local communities' control over and rights to these areas, together with achieving an increased recognition of the value, both economic and social, of these resources can promote resource conservation by making sustainable use a viable option.

But experience has also shown that for the economic returns from common property resources to reach their users, effective institutions and incentives for management are essential. Various traditional institutions exist for the management of the hidden harvest. Sacred groves of woodland, often associated with burial sites, can be important sources of tree fruit products in Zambia, Zimbabwe, Malawi and elsewhere. Local restrictions on use rights may be imposed for particular sacred trees that ensure that they are not chopped down and fruits are harvested.

In India, effective attempts to manage communal resources have been reported in forest panchayats of the Uttar Pradesh Hills and in Southern India. However, the components of success here and elsewhere have often included: small, relatively homogeneous community user groups with common goals; visible and definable forest areas; a high value resource worth managing well; and a system of enforceable rules supported by an enabling legal and institutional framework - and these will not always be present.

Pressures on common property resources often mean that traditional institutions are weakened. Increased social differentiation of the stakeholders in common property resources may mean that key actors in local institutions become less committed. With greater pressure on limited common lands from local and external sources the ability of past rules and regulations to operate diminishes. This is widely documented particularly for areas in India, Sri Lanka and Africa.

The question of how revenues from the hidden harvest should be distributed along the market chain is but a subset of the broader issue of benefit distribution—distribution of both monetary and nonmonetary benefits from biodiversity—among all stakeholders. A major question here regards how resource management is affected by the proportion of the total retail price that is captured by the resource owner, the harvester, intermediaries, and the retailer. A commonly raised concern, particularly in the developing world, is that resource owners/harvesters receive a small fraction compared to intermediaries and retailers. Reasons often include poorly allocated property rights at the local level and the strong control exerted by politically powerful market intermediaries (WWF 1996).

Effective institutions will, therefore, require the support of:

- legislation that recognises and guarantees rights for local people over the use and benefits of wild resources;
- institutional reforms that vest control and planning with local user groups;
- economic incentives and effective mechanisms for controlling access and the sharing of benefits locally.

(ii) The Hidden Harvest in Agricultural Areas

The importance of wild resources in and for agricultural systems must be acknowledged, especially by organisations involved in agricultural and forestry research. To reduce the risks associated with

subsistence agriculture, access is needed to a diversity of resources adapted to different environmental conditions and available during distinct seasons and at specific sites.

Genetic simplification and standardisation of agricultural production threatens livelihoods and the sustainability of agriculture and biodiversity. More emphasis is needed on low external-input agriculture, building on local needs and knowledge, and the optimal use of internal resources. More participatory approaches to agricultural research and extension are also needed to support and build upon the on-going processes of farmers' experimentation using wild resources. It is in agricultural systems based on these principles that the greatest diversity of wild and semi-wild resources can be found.

As it is recognised that the increases in grain yields made during the Green Revolution will be difficult to replicate in the future, it is important to look at the genetic wealth inherent in uncultivated resources. Agricultural research centres should initiate research into wild resources to identify those which have the greatest potential (eg. the most nutritious; or highest yielding; or drought resistant) for feeding growing populations in changing environments, as well as methods to improve their conservation and management. This research will most effectively be conducted in collaboration with farmers and other resource users. Farmers, especially women, are extremely knowledgeable about the use and management of wild resources. Therefore, their active participation should be sought to help shape such research planning and development.

Ex Situ Conservation

For many years the international community has relied almost exclusively on the ex-situ conservation of plant genetic resources and has been slow to turn its attention to in-situ conservation.

Seed banks, certainly in terms of their current usage, are not designed to preserve the biodiversity of crop varieties but only to preserve representatives of wild or domesticated species, especially those native to other areas of the world, which are viewed as having potential value for crop improvement. Thus, seed banks are more a vehicle for commercialisation of germ plasm than for preserving biodiversity. They are part of the machinery used by commercial breeders, and now genetic engineers, to develop crop varieties that, by law, they can increasingly patent and own. Globally, 48% of accessions are advanced cultivars or breeding lines, 36% are old cultivars or farmers' varieties and only 15% are wild or weedy plants or crop relatives. Greatly lacking are crops that do not enter international trade and are "only" important at national or local levels.

Opponents of ex situ conservation point out that the conservation system based on gene banks relies on a crop-by-crop fragmentary approach, which ignores the interactions of the different elements in the agro-ecosystem, as well as the role of farmers' knowledge. It cuts the genetic materials developed by farmers off from their evolutionary process and thus forms a static approach to conservation. In contrast, in-situ conservation allows for the adaptation of plants and animals to the constantly changing local environment and for the crossing of wild species with cultivars.

A conservation system that leaves aside indigenous peoples, farmers, peasants, pastoralists and their knowledge, and expropriates their materials - making them available as raw materials to breeders and biotechnologists that may claim intellectual property rights over their "creations" - is doubly perverse. No only do local communities lose control over their heritage - agricultural biodiversity - but they also lose the possibility of sustaining livelihoods which build upon diversity.

Ex-situ collections are also vulnerable and the FAO has recognised this in its State of the World Report. In 1996, the seed banks of the world are in trouble. Owing to under-funding and inadequate facilities, they cannot reliably preserve even the germ plasm entrusted to them today - not to mention the avalanche of traditional crop varieties and wild crop relatives that could be

anticipated were they to embark on the conservation of these resources. There are major problems with regeneration of seed stocks and a lot of the material in gene banks is quickly losing its viability and there is a lot of uncoordinated duplication. In addition, many countries do not have either the funds, facilities or staff necessary to conduct their activities. Some countries have expensive excess storage space and find it hard to keep up with the growing maintenance costs, while other countries lack proper long-term facilities.

The global picture, according to the FAO Plan of Action, is a steady deterioration of many facilities and their ability to perform even basic conservation functions. This is serious language, especially if it comes from an agency that is coordinating a global system on plant genetic resources which takes the ex-situ gene bank approach as the starting point. The security and duplication problems in the current gene bank system lead to a situation where genetic erosion in the banks may well be higher than could be anticipated in the field.

The Global Plan of Action acknowledges these problems and has adopted a strategy for sustaining and expanding ex situ conservation activities but this will require considerable funding just to restore collections, let alone expand them.

There is no doubt that ex-situ conservation is needed and that, if the existing collections are to be saved, an improvement of the security conditions and efficiency in the management of gene banks is needed, especially since a large part of the diversity they contain no longer exists in the field. But to rely solely on this approach is neither feasible nor advisable and there needs to be greater emphasis on in-situ management as the primary conservation method, an emphasis supported by Article 9 of the CBD itself.

CONCLUSION & RECOMMENDATIONS

It should be clear from the preceding that there is a pressing need to conserve the hidden harvest, not only for its intrinsic value, but also because of the very real importance that those resources themselves have on a day to day basis for the survival of those people who rely on them as well as their vital importance in the maintenance and development of domesticated crop varieties, domestic animal breeds, and fish species.

The CBD has a critical role to play in the conservation and sustainable use of the hidden harvest. The Conference of Parties should, therefore,:

- * adopt the recommendation of SBSTTA2 and encourage Parties to actively implement the Leipzig Global Plan of Action on Plant Genetic Resources for Food and Agriculture, particularly as it relates to the promotion of insitu conservation of wild crop relatives and wild plants for food production;
- * acknowledge and support the recommendation of SBSTTA2 that it carry out gap analysis work on the issue of wild sources of food and, in particular, invite SBSTTA to:
 - * produce an inventory of such sources of food and other important resources;
 - * investigate means for national and local level valuation of those resources, particularly in natural resource and agricultural development policies;
 - * identify and develop appropriate procedures and tools for implementing in situ conservation for these resources both within and outside protected areas;
 - * assess the need for Contracting Parties to ensure that environmental impact

assessments and development strategies take into account the full value to local people of areas containing wild resources to prevent them from being replaced by activities of less benefit;

- * consider how strategies for promoting the development and commercialisation of under-utilised crops and species can ensure the sustainable management of these resources;
- * identify and develop appropriate procedures and tools for implementing policies, such as joint management agreements, allowing increased access to local and indigenous resource users to the hidden harvest in protected areas;
- * assess the need for management of the hidden harvest to be devolved to the local community level and for support to be given to the development of local institutions for managing community property resources and to the equitable sharing of benefits from their utilisation;
- * consider the need to place much greater emphasis on low-external input agricultural systems which encourage and enhance diversity. The role of farmers in the management and development of genetic diversity should be supported through more participatory approaches to agricultural research and extension.

WWF-UK
tel: +44-1483-426444
fax: +44-1483-426409
email: nwatson@wwfnet.org

Sustainable Agriculture Programme
IIED
tel: +44-171-3882117
fax: +44-171-3882826
email: iiedagri@gn.apc.org

APPENDIX 1: Guidelines for Managing Commercial Consumptive Use of Wild Species for the Benefit of Nature Conservation

Guideline 1. Wild species have intrinsic worth and nourish human cultural and spiritual values that should balance the influence of economic forces in nature conservation.

Guideline 2. Commercial, consumptive use (CCU) should be promoted only where it is likely to create conservation benefit.

Guideline 3. A goal of any CCU program should be to maintain current and future options by maintaining biodiversity and avoiding irreversibility.

Guideline 4. Natural ecological fluctuations and processes, and the life-histories of organisms, should provide the blueprint within which we design CCU programs.

Guideline 5. Adaptive management is required to cope with uncertainty in both ecological and socio-economic systems.

Guideline 6. When moving from traditional, subsistence use to commercial use, traditional knowledge and management systems should be augmented with science-based approaches.

Guideline 7. Revenues from CCU should be sufficient and distributed in such a way as to cover the costs of sustainable use management and to create incentives for biodiversity and wildland conservation, but CCU should not be expected to carry the full costs of conservation.

Guideline 8. Diversified economic benefits from biodiversity and wildlands, secured in part by getting free riders of biodiversity-based values to pay their fair share, should be promoted.

Guideline 9. To make wildlands competitive with alternative land uses, some biodiversity may need to be sacrificed.

Guideline 10. Benchmarks of biodiversity and ecosystem integrity should be developed and used to set conservation goals, to define acceptable limits of change due to CCU, and as an index against which to monitor change.

Guideline 11. Ecological and socio-economic subsidies will often be required to make the transition toward sustainability.

Guideline 12. Management of wild species should be balanced between assigning resource tenure and management responsibility to the lowest level commensurate with the scale of resource use, and regulation by broader authorities for the public good.

Guideline 13. The full value of biodiversity and ecosystem services should be reflected in decision making about management of a wildland.

Guideline 14. Market demand should be more effectively used as a tool to promote better management.

Guideline 15. Better national and international coordination and action is required to improve the sustainability of CCU and its use as a conservation tool, and to mitigate the negative impacts of CCU on biodiversity.

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