



The Hidden Harvest

The Value of Wild Resources in Agricultural Systems

A SUMMARY



**Sustainable Agriculture Programme
Environmental Economics Programme**

IIED

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What?

The *Hidden Harvest* is a research project coordinated by the Sustainable Agriculture Programme of the International Institute for Environment and Development (IIED), in collaboration with IIED's Environmental Economics Programme. It aims to investigate, through local-level valuation, the importance of wild plant and animal resources in agricultural systems and to rural livelihoods.

Why?

Conventional agriculture and forestry research have concentrated on major commodity crops, with little attention being paid to the range of other 'wild' resources harvested in agricultural and forested areas. This neglect has grave implications for people's livelihoods and the maintenance of genetic and biological diversity.

- Wild resources are important over the whole range of agricultural systems, throughout the world. They are not the exclusive preserve of 'hunting and gathering' societies.
- Wild 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. They also supply vital nutritional supplements to diets based largely on carbohydrate-rich staples.
- Many wild resources have significant economic value by preventing the need for cash expenditure and providing ready sources of income to cash-poor households, in many cases yielding a better income than local waged labour. There are also many cultural and existence values associated with wilderness areas and wild resources. All such values need to be recognised to ensure accurate and relevant agricultural and forestry development; but few methodologies are able to achieve such a comprehensive assessment.
- Increasing the economic value of wild resources can encourage their conservation by making wise use a viable alternative to environmentally destructive activities such as ranching and monocultural agriculture. Seeking ways in which sustainable management and conservation of wild resources and wilderness areas can be supported through economic incentives and institutional strengthening is key to ensuring their continued existence.
- Wild genetic resources are key for the future of agricultural production. Conservation and management of such resources on farm and by farmers will help to ensure the maintenance of biodiversity. However, the removal of germplasm and subsequent patenting and commercial use potentially results in the loss of value of wild resources to local people. Therefore, local rights to use, access and profit must be secured.

How?

1. A comprehensive annotated bibliography on the subject, published in 1992, summarises the extensive diversity of ways in which wild resources are important both to local livelihoods, and also on a more global scale.
2. Joint work by IIED's Sustainable Agriculture and Environmental Economics Programmes has defined the basic principles of a methodology for understanding the value of wild resources for local people. This approach combines Participatory Rural Appraisal (PRA) methods with economic concepts and tools.
3. A series of case studies with collaborators in Africa and Latin America have helped to test the feasibility of and refine the approach. The case studies have also involved training of local researchers and development workers.

What Next?

Work to date has identified key areas where policy should be strengthened if the full value of wild resources is to be realised and their sustainable management encouraged. These include policies related to biodiversity conservation, food security, agricultural research and forestry management.

The project intends to add biological survey techniques to the methodological package. This is in recognition of the importance of ensuring the ecological sustainability of wild resource use by rural peoples.

Lessons from the *Hidden Harvest* work to date can feed into other initiatives, particularly by local people themselves. The methodological approach could be useful for communities attempting to defend and manage the resources on which they depend in the face of external pressures.

The Value of Wild Resources in Agricultural Systems¹

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 agricultural peoples (Scoones, *et al.*, 1992). 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 encompass a wide range of activities, of which wild resources are often an important component.

In this paper, wild resources include all non-domesticated plant and animal species which are used by people. However the use of the word "wild" does not imply the absence of human influence and management. As scientific understanding improves, 'wild' resources and areas are increasingly seen as the result of co-evolutionary relationships between humans and nature (Kingdon, 1993).

As this paper illustrates, wild resources are collected to improve diets, to tide people over in times of famine, to supplement income, to provide genetic material for experimentation, to provide medicines, food, utensils, craft and building materials. Wild areas are also often of significant cultural or spiritual importance.

Yet the value and importance of wild resources to people's livelihoods are often hidden to outsiders and therefore difficult to quantify. As a result they tend to receive little recognition from the development community of policymakers, researchers and practitioners. Failure to recognise this value means that so-called 'wastelands' are converted to commercial uses such as industrial plantations. In other cases, high external-input agriculture displaces more diverse traditional agricultural systems. This may have grave implications both for people's livelihoods and for the maintenance of genetic and biological diversity.

The *Hidden Harvest* project was initiated by IED's Sustainable Agriculture and Environmental Economics Programmes to understand the importance of wild resources to rural people and to develop practical methods to make this value more visible. In this paper we first summarise the range of ways in which wild resources are important not only to rural people but also, potentially, on a global scale. We then describe an approach for making a more comprehensive assessment of the value of the hidden harvest, illustrated by examples. Finally we address some of the implications for policy if the true value of the hidden harvest is to be realised and protected.

Integrated production systems

Many rural people, regardless of whether their agricultural systems are predominantly pastoral, swidden or based on continuous cropping, deliberately incorporate wild resources into their livelihood strategies (Box 1).

Collecting, using, selling and managing wild resources, as well as experimenting with their cultivation and domestication, are an inextricable part of many agricultural systems.

Within agricultural systems, the greatest diversity of wild resources is found in multi-layered, complex agroforestry systems and home gardens. Wild resources may also be important in apparently simple monoculture systems (Ali, 1989), and in disturbed sites associated with agriculture, such as field edges, fallows, erosion gullies and pathways.

Farmers have always incorporated useful trees in their farming systems. Trees increase the structural complexity of the field environment and provide a range of ecological habitats and seasonal niches ideal for wild resource production (Scoones *et al.*,

Footnote 1 This section is largely based on Scoones, I., Melnyk, M., and Pretty, J.N. (1992). *The Hidden Harvest: Wild Foods and Agricultural Systems: A Literature Review and Annotated Bibliography*. International Institute for Environment and Development, Swedish International Development Authority and Worldwide Fund for Nature, London and Gland.

1992). Arable lands also attract many pest species, a surprising number of which are useful. Rodents of various sorts are an important source of protein in some agricultural communities, while some weedy plant species are nutritious foods (Alvarez-Bullya Roces *et al.*, 1989; Brandao and Zurlo, 1988). They are also convenient to collect whilst working in the fields.



Photo: Mary Melnyk

Swidden field in Southern Venezuela

Swidden, or shifting cultivators, do not rely solely on the cropped phase of the swidden cycle. The fallow phase is also important as the regeneration process yields a range of useful wild species. Certain plants unavailable in primary forest may occur only in disturbed fallow areas. In many cases these fallow fields are actively managed for wild food production.

In many pastoral systems, a diet largely based on livestock products is usefully complemented through the collection and consumption of wild foods, especially grains. The productivity of wild grain harvesting can be high relative to alternative cultivation options. For example, the collection of *Panicum laetum* yields 400-1100 kg/ha in the most productive, low-lying valleys of the Malian Gourma, higher than typical yields of millet (Maiga *et al.*, 1991). The harvesting of tree products such as gum arabic can form an important part of the pastoral economy.

Although many wild resources are found within and around fields, some are also collected from further afield, from less disturbed habitats such as woodland, forest or savanna.

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 (Soemarwoto and Conway, 1991). A range of annual and perennial crops are grown together, complementing the main rice crop. There are 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 (Michon, 1983).

The Philippines: Home gardens are also important for experimentation with new varieties derived from wild species. The Hanunoo traditionally considered over 1,500 plants to be useful and cultivated about 430 of these in their swidden fields (Conklin, 1954).

Botswana: The use of a diversity of species is not limited to forested areas. The agropastoral Tswana use 126 plant species and 100 animal species as sources of food (Grivetti, 1979).

Brazil: A study of the agroforestry systems of a Brazilian family living in the Amazon estuary shows how they harvest various native and exotic species from a home garden, managed floodplain forest and unmanaged floodplain forest. Within the managed area, some vines, shrubs and trees are cut. The unmanaged area contains economically important species such as the acai palm (*Euterpe oleracea*) and rubber (*Hevea brasiliensis*). Together these three zones provide fish, game, fruits, medicines, household items and oilseeds, not only for home consumption, but also for sale. With the cash, the family is then able to buy other staple goods (Anderson *et al.*, 1985).

United Kingdom: In the Middle Ages manorial estates appear to have been highly sustainable systems. This sustainability was not achieved as a result of high productivity but because of the integrated nature of farming and the great diversity of produce, including wild resources. Wild resources were important for food, fodder for livestock, green manuring and various household goods. They were carefully managed at the local level through by-laws that varied from village to village. The expansion of agriculture into common property lands led to increased gross agricultural production but declining woodland, pasture and marshland resources and critically a loss of buffers for the rural poor. This contributed to agricultural recession and the eventual decline of the manorial system (Pretty, 1990).

Food security

Integrated production systems help to ensure a steady supply of food throughout the year. Moreover, the appearance of many wild foods may coincide with the hunger season which precedes crop harvests (Chambers, *et al.*, 1981). At these times farmers depend on such wild foods to replace the missing nourishment of staples and to provide the necessary energy to harvest their fields (Campbell, 1987; Longhurst, 1985).

Wild foods provide insurance against crop failure, pest attack or drought because they can replace some of the lost crops (Saxena, 1986).

Many wild foods have an advantage over cultivated crops in that their seeds can germinate and grow under drought conditions (Saxena, 1979). During such times, local people not only rely more heavily upon the usual forest resources, but also on those wild foods which require extensive processing before consumption. In West Africa, wild 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 (Bhandari, 1974). In response to the 1984-85 famine in Sudan, 91% of people in one village collected wild grains (De Waal, 1989), a major factor in their survival during the famine.

Nutritional benefits

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. A balanced diet of carbohydrates, proteins, fats, and micronutrients is necessary. Many poorer people lack access to marketed staple crops and draw on wild foods for supplementation. The consumption of fats in diets is particularly important for the proper development of children (Heird and Cooper, 1988).

It is access to a wide range of wild foods and the resulting dietary diversity that contributes to nutritional well-being. Wild plants can have higher fat, protein, mineral and vitamin contents than cultivated species.

The wild rice *Zizania aquatica* has higher concentrations of protein, magnesium, phosphorous, potassium and vitamins B₁ and B₂ than cultivated *Oryza sativa* (Murakami, 1988). The wild bean *Vigna minima* was also found to be of equal or greater nutritional value than the cultivated species *Vigna umbellata*. Game and fish are also major sources of protein and fat. In Southern Venezuela, a Huottuja Amerindian village received 45% of its fat intake from wild plants and 27% from wild animals (Melnyk, 1995).

Wild foods are part of the diets of farm households on a daily basis, not just during periods of food shortages (Ogle and Grivetti, 1985).

For instance, in Mali poorer households may combine the use of porridge derived from *Boscia senegalensis* fruit with their limited stores of cultivated millet (M. Martin, 1985). In a Tanzanian village 81% of the vegetable side dishes were composed of wild plants (Fleuret, 1979). In Northern Nigeria leafy vegetables and other bush



Photo: Fiona Hinchcliffe

Flowers of Aloe greathendii collected from the wild to accompany the maize staple, Zambia

foods are collected as daily supplements to relishes and soups (Longhurst, 1986). Better nutritional status is associated with proximity to forests or the presence of home gardens or orchards (Ileuret, 1979; Saowakontha, *et al.*, 1989).

Economic and cultural values

It has been calculated that the value of all wild resources to local people, for subsistence consumption or sale, was more than US\$120 million in Tanzania in 1988 (Kiss, 1990). This represents 8 per cent of the total contribution which agriculture made to GDP in that year.

Wild resources represent ready sources of income to cash-poor households and may provide a significant proportion of total household incomes, particularly where farming is marginal.

Income derived from the collection and sale of wild 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 Ihuottuja Amerindians net 30% more through the sale of wild palm fruits 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 *Hyphaene petersiana*, and beer-brewing from the wild fruit *Grewia bicolor* 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. In Thailand, for example, households living far from forests spent three times as much money on food (excluding rice) than those living near forests (Saowakontha, *et al.*, 1989). The use of wild resources for fuel, or to make household and agricultural implements and for building materials also offers an important, low-cost alternative to the cash economy, which may be prohibitive to poorer households. Other economically important uses of wild resources include forage and fodder for livestock, hunting and fishing, medicinal plants and charms, raw material for traditional crafts, or recreational use.

Another type of value consists of the many indirect benefits afforded by wild resources, as a storehouse of genetic diversity for crop breeding, as habitat for bees and bats which pollinate cultivated crops and orchards, or as wooded land which protects against flooding and may help to regulate local climate.

Finally, a third category of value includes various intangible or non-use benefits derived from wild resources, which may be important both globally and locally.

The cultural or spiritual value of some wild resources or wildlands can sometimes be considered more important than monetary value. For instance, many rural communities designate certain wild resources or wild 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 (Box 2).

Socially differentiated use

Different types of wild harvest are used by different



Medicines derived from wild products, India

Photo: Ian Scoones

people at different times, and so contribute to livelihood strategies in a complex fashion.

Understanding how collection, use and marketing of wild resources is differentiated by wealth, gender, age and ecological situation is essential to assess their overall economic value.

Wild resources are particularly important for the rural poor, women and children, especially at times of stress such as drought, changing land availability or ecological change. These groups generally have less access to land, labour and capital and thus need to draw more on the wild resources that are freely available.

In Zimbabwe, some poor households rely on wild fruit as an alternative to cultivated grain for a quarter of all dry season meals (Wilson, 1990). Lower on-farm returns necessitate the diversification of income sources which often includes the use of wild foods. For example in India, the poor obtain 15-23% of their total income from common property resources, as compared with 1-3% for wealthier households (Jodha, 1986). In Brazil's Maranhao State, some of the landless depend on the collection, processing and

sale of resources from the wild palm, *Orbignya phalerata*, for their livelihoods (Hecht, et al., 1988).

It is also the poor who are often most affected by changes in land use and tenure. Privatisation denies free access to the wild resources of common lands.

Deforestation and the establishment of forestry plantations and protected areas have a particularly large impact on the poor who rely on local resources.

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. Furthermore, women can become the most knowledgeable community members about the whereabouts, properties, management and processing requirements of wild 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 wild foods (De Waal, 1989).

Wild foods are also important nutritional supplements for children, who are often the most frequent collectors and consumers of wild fruits (Campbell, 1987; Wachira, 1987). Wild fruit may be eaten by children as snacks on their treks to school or while tending animals. Since children are particularly prone to malnutrition, their foraging activities provide essential supplies of fats and proteins from insects and small mammals, and of vitamins and minerals from wild plants and fruits.



Rheedia sp. gathered from the forest floor by children for snacks, Venezuela

Box 2

Cultural values in Zimbabwe

In a ranking exercise conducted to show the relative importance of different values derived from savanna woodland, villagers explained that one of the most important aspects of their woodland was the sacred areas it contained. Respecting and preserving these sacred areas according to the wishes of the ancestral spirits is essential for good rainfall. Likewise the sites where the annual rain-making ceremonies take place are of primary importance. The wide range of consumption benefits derived from the woodland were ranked lower than these spiritual and ecosystem functions, as they could not exist without the rains, which in turn depend upon the sacredness of the woodland.

Source: Hut Springs Working Group, 1995.

Photo: Mary Meehik

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Agricultural Intensification and the Hidden Harvest

It is clear that wild resources are of great importance in a variety of ways, and at different times to different people. This importance is not reflected, however, 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.

This staple-crop oriented approach overlooks the role played by wild resources in agricultural systems and has serious implications for livelihoods and for the maintenance of genetic diversity:

- As traditional agroecosystems are simplified and cultivated areas expand, the availability and use of wild resources has diminished. The loss of these resources can reduce farmers' food security by reducing the variety of available foods. 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.
- 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 in some societies are the most knowledgeable 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 wild food availability 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 within crops.
- The considerable wealth of indigenous knowledge that exists on the uses and management of wild resources may be lost from one generation to the next as they 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.



Experimenting with wild species: several different wild palm species are propagated in the micro-climate created by a tree stump, Venezuela.

Photo: Mary Meade

Maintenance of Genetic Diversity

Long term food security for the world's population will continue to depend on wild genetic resources. Genes from wild plants and animals have been the source of agricultural innovation for centuries (Box 3).

Much of conservation and management of such resources on farms and by farmers will help to maintain biodiversity.

Much of the genetic diversity on which the improvement and future sustainability of agriculture must depend is found in and around farmers' fields, in village woodlands and in grazing lands.

Wild resources are often a useful source of genetic adaptation to ecological change. 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.

The *in situ* management of wild genetic resources is likely to be the most effective conservation method in the long-term.

In situ conservation allows for the adaptation of plants and animals to the constantly changing environment and for the crossing of wild and weed species with cultivars, something that farmers have been doing for centuries. This approach must complement that of many national and international agricultural research centres where the focus is on the *ex situ* conservation of relatively few crop species.

Acknowledging the wealth of knowledge possessed by farmers is a step in the right direction. Agricultural research needs to be conducted with farmers on farm, rather than in laboratories and field stations.

Incorporation of indigenous crops and other native plant germplasm in the design of self-sustaining agroecosystems should ensure the maintenance of local genetic diversity available to farmers.

Protected areas

Parks and nature reserves have long been considered the best means of preserving areas rich in biodiversity. There are now close to 8,500 major protected areas throughout the world. At least another 40,000 protected areas of various sorts have also been established, bringing the total land area protected to almost 10 per cent of the earth's surface (McNecley, 1994). Usually 'protection' means forbidding human use of wild resources, often achieved through rigorous enforcement. But this does not recognise the importance of local management and land-use practices in sustaining and protecting biodiversity, nor the role that biodiversity plays in contributing to local people's security of livelihoods.

A growing body of evidence now suggests that the transfer of 'Western' conservation approaches to the South has had adverse effects not only on the food security and livelihoods of people living in and around protected areas, but also on the diversity and ecological status of the protected areas themselves (Pimbert and Pretty, 1995; IED, 1994).

Lack of livelihood security ultimately undermines conservation objectives as poverty and rates of environmental degradation intensify in areas surrounding protected areas.

Box 3 Wild Plants and Agricultural Research

A pest called the cabbage aphid (*Brevicoryne brassicae*) spoils an estimated £100 million of vegetable crops in Britain each year, despite the use of powerful pesticides by farmers. Now researchers in Britain have identified a wild plant that resists the aphid. The plant, *Brassica fruticulosa*, is a relative of the cultivated Brassicas, and is one of the most commonly collected wild food plants in the Mediterranean region. People collect the leaves to add to salads. This wild relative makes a protein that blocks the aphids' taste receptors. The insect behaves as if it has landed on an inedible plant and flies away.

Source: Coglian, 1995.

Open protests against protected areas have become common in many countries (Box 4). The preservationist mode of intervention is financially expensive (Pimbert and Pretty, 1995). These funds often depend largely on outside help and are subject to the vagaries of international politics. The benefits of such a strategy are also one-sided, accruing mainly to external groups interested in conservation and not to local inhabitants. However, it is the local inhabitants who shoulder much of the burden, through lost access to resources, damage to crops and through the physical danger presented by many wild animals.

Institutions for wild resource management

Draconian legislation which restricts access to traditional lands changes the status of wild resource collectors to illegal poachers or trespassers.

Such legislation undermines local people's traditional rights to and regulation of wild resource use and results in unsustainable exploitation.

Reinstating legal access and increasing the economic value of wild resources can promote resource conservation by making sustainable use a viable option (Shelton, 1995). Areas of common property are often an important source of wild resources, particularly for socially and economically vulnerable groups such as the poor, the young and women. It is these groups, too, who often have detailed knowledge about the sustainable management of these key resources.

Experience has shown that for the economic returns from common property resources to reach their users, effective institutions and incentives for the management of common property are essential (Murphree, 1994). These must include:

- 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; and
- economic incentives and effective mechanisms for controlling access and the sharing of benefits locally.

Indigenous institutions often exist for the management of wild resources in common property areas. But greater pressure on limited common lands from local and external sources can mean that such institutions are weakened. Promoting effective institutions for wild resource management represents a major challenge for policymakers.

Experience has shown that success hinges on several factors (Scoones *et al.*, 1992):

- small, relatively homogenous community user groups with common goals;
- visible and definable resource areas;
- a high value resource financially worth managing well; and
- a system of enforceable rules supported by an enabling legal and institutional framework.

Intellectual property rights

There is good evidence to show that almost every part of the globe has been inhabited, modified or managed by humans at some time in history (Parsons, 1975; Pimbert and Pretty, 1995). Human influences have often actively maintained and enhanced biodiversity in forests, wetlands, grasslands, agricultural areas and other environments from which rural people have historically derived their livelihoods (Fairhead and Leach, 1994). Farmers have built up detailed knowledge of the uses and properties of wild

Box 4

Protests against protected areas in India

In India, resentment to national parks legislation and enforcement agencies has led to acts of sabotage and civil disobedience. Villagers have set fire to large areas of national parks, such as in the Kanha National Park of Madhya Pradesh (Gadgil and Guha, 1992). The Manas Tiger Reserve in Assam, India is located on the former traditional homeland of the Bodo tribal people. Taking advantage of the remoteness of the Manas area and the resentment of local Bodo who lost lands to the reserve, insurgents have taken over the area and driven out park guards (Roy and Jackson, 1993). The Bodo insurgents have been killing wildlife to provide funds to arm their movement (Kumar, 1993).

Source: Pimbert and Pretty, 1995.

species, and have experimented with crop breeding and genetic improvement. Agricultural policies on intellectual property rights do not acknowledge the innovations, labour and knowledge of rural people which have 'shaped the wild' (Pimbert and Pretty, 1995).

Existing legal frameworks are insufficient to protect the rights of the current resource managers, the farmers, forest dwellers and pastoralists (Shelton, 1995). For example, the



Photo: Crucible Lane

GATT Uruguay Round of trade negotiations gave biotechnology companies the right to patent seeds, plants and new natural products (perfumes, oils, drugs, biopesticides) often identified with the help of indigenous knowledge. The result will be to secure the profits of the industrialised countries who process traditional knowledge, without allowing any benefits to those supplying the resources and knowledge (UNDP, 1994; Crucible Group, 1995).

Barabaig elders meeting, Haiyang District, Tanzania

subsequent patenting and commercial use may even deprive local people of access to wild resources. Their rights to use, access and profit from wild resources must be secured for their own livelihoods and for the sustainable management of biological diversity.

Removal of germplasm and

Methods for Valuing the Hidden Harvest

Assessing the economic value of wild resources means that they can then be taken into account in planning and policy decision-making. Because many wild resources are not traded internationally, or are collected and consumed directly without passing through markets, or are of value mainly to the poor, they have generally been ignored by government decision-makers and international agencies. 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.

The danger of ignoring other, hidden, values is that policy will treat many areas as unimportant, or as wastelands, and allow them to be replaced by other uses. This will incur losses at both local and national levels.

Other areas, such as field borders, gullies, home gardens and fallow lands have also often been ignored in the analysis of resource value. This has biased conventional resource planning in favour of commercial outputs and undervalued the hidden harvest.

Assessing the full value of an area containing wild resources can also provide a community with a vital tool for fighting expropriation by outside interests.

A comprehensive assessment of value also helps communities realise the incentives to be derived from the sustainable management of wild resources, and can catalyse the design of effective local management structures.

Valuation studies

However, 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.

Nevertheless, the range of ways that wild resources matter to local people should be recognised. Three general categories of value may be distinguished (Pearce *et al.*, 1989):

- direct use values (for consumption or sale);
- indirect use values (environmental functions);
- non-use values (cultural, religious and existence values).

A complete valuation of direct use must take into account both the marketed and subsistence benefits and costs. Attaching a monetary value to subsistence use may be complicated if the resource in question is not traded, in which case data on the market price of commercially-traded substitutes may be used as a proxy value. Alternatively, the opportunity cost of time spent collecting and processing the resource may be estimated, in terms of wage income or returns to labour in other activities. Problems in valuation may arise if substitute products are not perfectly comparable, or where the opportunity costs of labour vary among different groups or across seasons.



Photo: Irene Gullit

Matrix comparing hidden harvest based activities with other income sources in Brazil.

Valuing the indirect environmental functions of wild resources is even more difficult. This requires an assessment of the potential impact of the loss of a particular wild resource or habitat on ecological services, and an estimate of the resulting impact on the costs or productivity of economic activities which depend on those services.

Estimating non-use values presents similar dilemmas. While the cultural value of wild resources is often as important to rural communities as their economic value, assigning a monetary equivalent to this importance is not straightforward. Typically, survey-based methods such as contingent valuation or contingent ranking are used to elicit estimates of willingness-to-pay for such non-use values (Lynam *et al.*, 1991).

In practice, most studies have concentrated on valuation of direct uses only. However, simple valuations can be misleading. Unless a differentiated analysis is carried out, it is difficult to highlight the often fluctuating value of resources according to season, or according to different viewpoints. For instance, in drought periods the value of wild foods may increase significantly as they can make the difference between life and death, particularly for poor households. What is their value then, and how can this be incorporated into long-term planning?

Another important question is how economic forces support or undermine the incentives for sustainable management of wild resources.

It is important to remember that economic valuation is not simply about making resources financially visible. It also means recognising that some resources can not be given a price tag, yet they are essential, either locally, nationally or both.

Defining a methodology

IIED's *Hidden Harvest* project has outlined a basic methodology to assess 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

Box 5

Local-level economic valuation of savanna woodland resources: village cases from Zimbabwe

This *Hidden Harvest* case study was conducted in two villages in eastern Zimbabwe. A variety of PRA methods (participatory mapping, farm transects, historical time lines, seasonal calendars, role plays and ranking and scoring) were combined with the more conventional valuation technique of derived demand to assess the total value of savanna woodland to local people.

The iterative interaction between qualitative and quantitative approaches was very effective. The derived demand approach identified those resources with a market value or of subsistence importance. For example, 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.

Role plays helped elicit beliefs and values. Villagers identified the members of their community who have a specific interest in wild resources. Different groups then prepared a short play, based on the activities of some of these people, to demonstrate the value of the woodland to them. The plays revealed a total of 19 values, ranging from water retention, aesthetics, camouflage, prevention of soil erosion, to crafts and windbreaks. The values were then ranked by the villagers in terms of importance to them. Non-market values such as water retention, rainmaking, inheritance, aesthetics and the prevention of soil erosion received a high score from all the groups involved.

Since firewood was not ranked as high by villagers as some of the non-use values described above, this suggests that the total economic value of the resource is many times higher than the monetary figure obtained solely through the derived demand approach.

Source: Hot Springs Working Group, 1995.

methods. The emphasis is on learning and planning with communities, rather than on extractive data collection for use by researchers external to the community.

Methodological complementarity

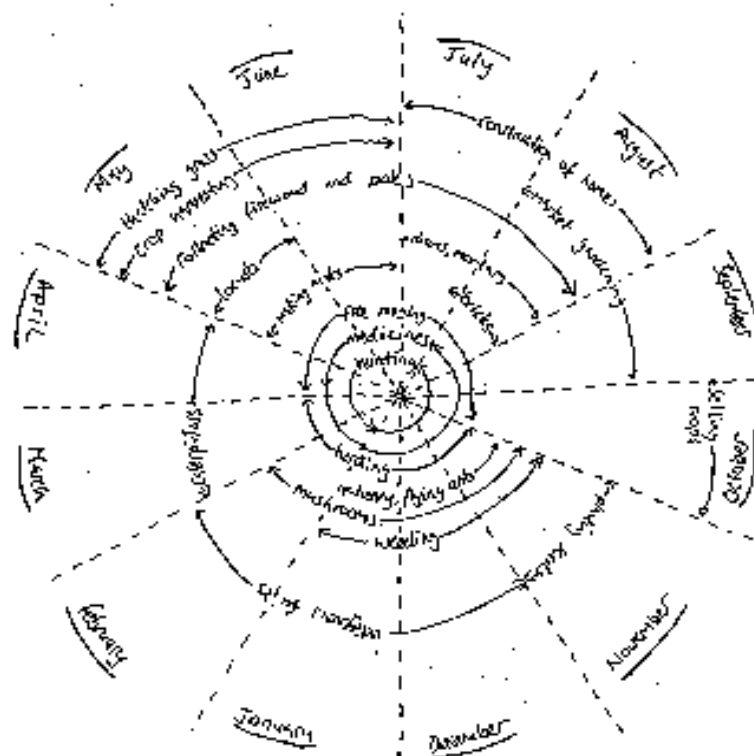
Through a series of case studies (Appendix 1), the range of approaches have been found to complement each other well. Whilst economics can provide the quantitative figures needed by policymakers, PRA can establish vital information on seasonal variation in use, socially differentiated use and value and the importance of indirect use and non-use values (Box 5; Figures 1 and 2). The two approaches have been used in parallel so that each builds on the information provided by the other. This further broadens the scope of the valuation.

The case studies to date have focused on using specific methods, rather than engaging in a local planning process. The next step is to work at making the use and findings of such valuations more locally relevant, so that they are of more direct use to local people in defence of their access and use rights to wild resources. More work is also needed to incorporate the use of ecological assessment techniques to address the sustainability of harvesting wild resources (Table 1).

The table shows how different methods available from three approaches can work together to help answer some of the questions about the importance of wild resources to local livelihoods. Although there is no fixed procedure for deciding which method is necessary at what stage and in what sequence, one example of a basic structure for the research process comes from the Zimbabwe study. At the start of the study, a sequence of questions was identified, for which appropriate methods were assigned (Figure 3). This moved from a general descriptive analysis at the community level to a more focused, specific investigation of resource value at the household level. Cross-cutting issues such as resource tenure and ecological sustainability were identified at the same time.

Figure 1

In Zimbabwe, seasonal calendars made by groups of local men, women and children showed how different product flows from woodland resources coincide with different activities in the annual cycle. In the dry season (May to October) a lull in agricultural activities reduces household labour requirements. This is the time for the labour-intensive extraction of woodland resources (collection of building poles and thatching grass, stocking up on fuelwood etc.). In the rainy season labour requirements in the fields are high but wild product availability and diversity is also higher. At these times mainly women and children collect wild resources opportunistically while working in the fields.



SEASONAL CALENDAR
MATERUNDE VILLAGE

drawn by
women of
Materunde
2003

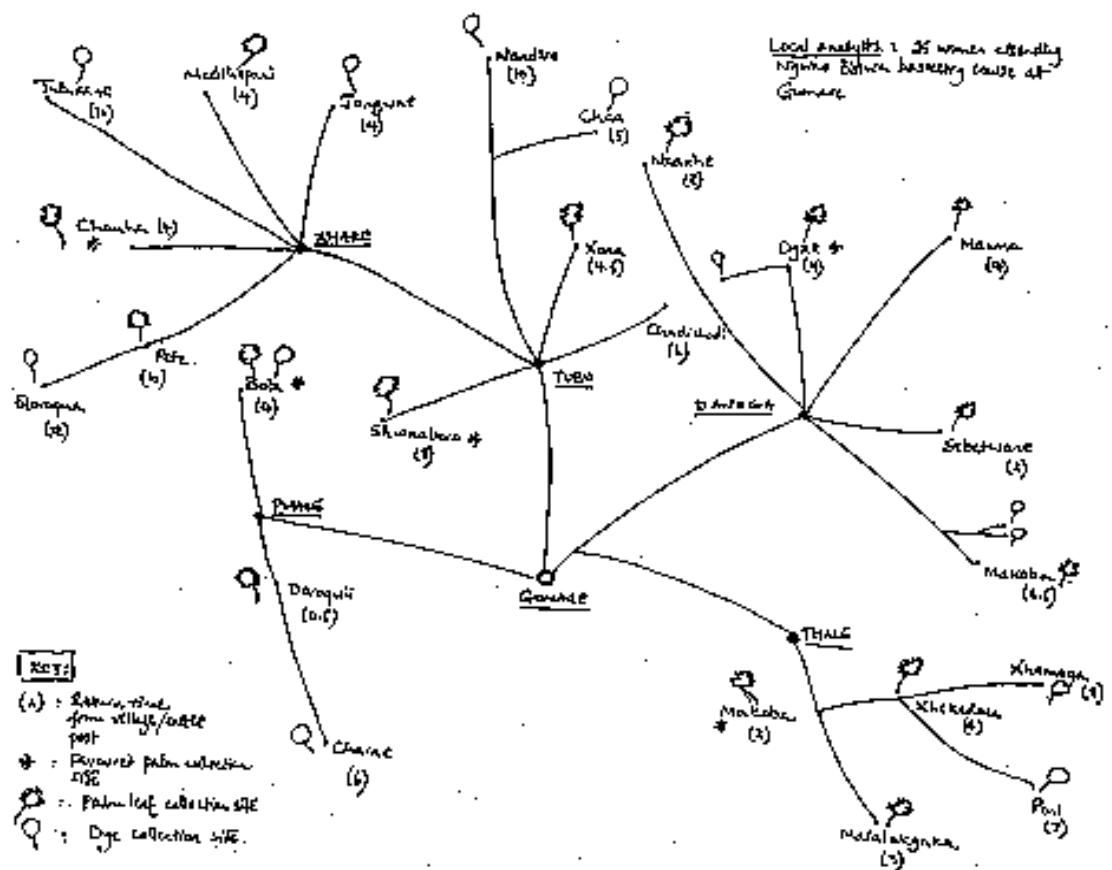
Source: Hot Springs Working Group, 1995

Summary of Methodological Complementarities

Question to be answered	PRA	Economics	Ecology
What resources are there, and where are they?	Participatory mapping; transects; interviews; mobility maps	Resource inventory; quantification of stocks, differentiated by cost and/or quality factors	Transects; quadrats; aerial photo analysis; yield measurement
When are they used/available?	Seasonal calendars; historical timelines, and maps; product flow diagrams	Household surveys, market surveys	Phenological studies; biomass calculations
Who uses them?	Wealth ranking; social maps	Consumption surveys	
How are they controlled?	Tenure maps; Venn diagrams	Analysis of market concentration	
What are they worth - marketed value?	Household interviews; mobility maps	Household surveys, market analysis; case studies; production cost approach	
What are they worth - indirect use and non-use values?	Role plays; ranking and scoring matrices; daily and seasonal labour and activity calendars	Production function approach; cost-based valuation; survey-based valuation	
How sustainable is the resource use?	Historical maps and transects; interviews with community elders; matrix ranking for abundance	Optimal control modelling; cost-benefit analysis of alternative land use options	Aerial photo analysis; vegetation quadrats; transects; fixed quadrats; coppicing/regeneration experiments; production-consumption analysis

Sources: Hut Springs Working Group, 1995; Kathrin Schreckenberg pers. comm; Martin, 1995

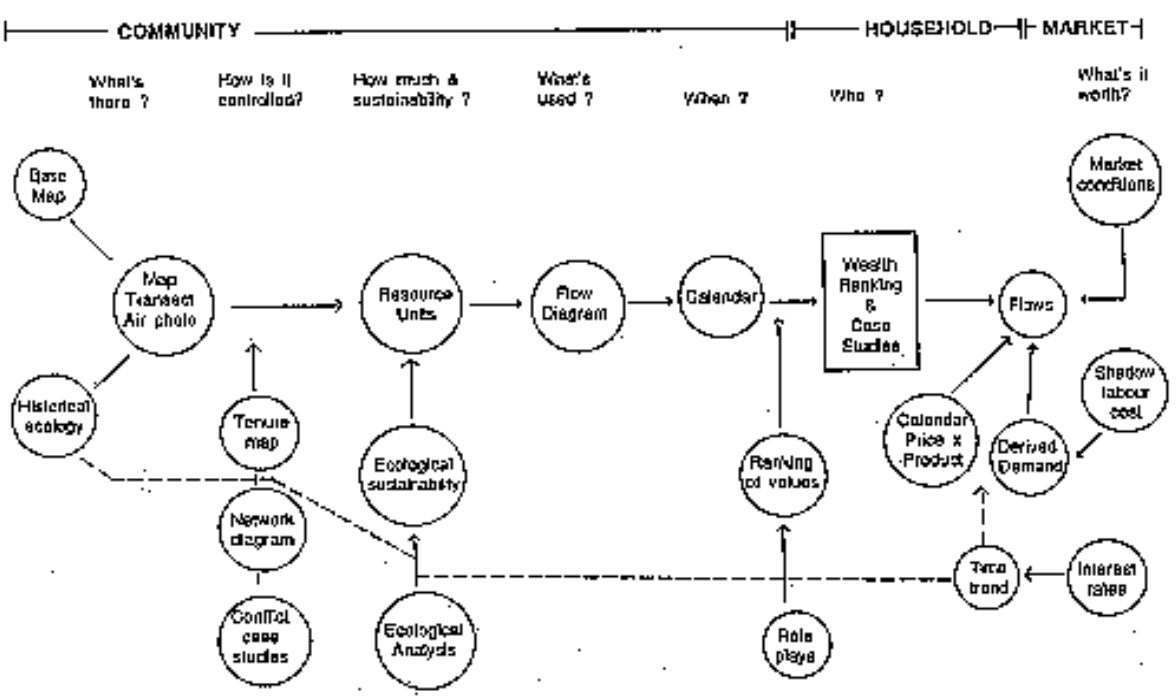
Figure 2



Women in Botswana identified a number of different collection sites for palm leaves and dye during a ground mapping exercise. Sites were selected according to a number of criteria, including, walking distances; availability of resources/density of trees; quality of product (soft leaves, strong, dark dye); dangers of travel (lions, crocodiles, snakes); and inconvenience of travel (water, rough terrain).

Source: Bishop and Scoones, 1994

Figure 3



Proposed methodological sequence for the valuation of woodland resources

Sources: Har Springs Working Group, 1995

The following measures are thought to be essential if the hidden harvest is to become more visible to policymakers, and to continue to provide a sustainable means of maintaining rural livelihoods, and enhancing agricultural and biological diversity.

Agriculture

- 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. It is in agricultural systems based on these principles that the greatest diversity of wild resources can be found.
- The importance of wild resources in 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.
- 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 wild foods. 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. Research could include not only their conservation in the wild, but also their cultivation.
- 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.

Biodiversity

- There should be a greater emphasis on the *in situ* conservation of genetic diversity to allow for adaptations to environmental change. The role of farmers in the management of genetic diversity should be acknowledged and supported through on-farm research.
- National park and protected area management plans should incorporate structures to enable the legal and sustainable harvesting of wild resources. Participatory approaches to park management decision-making should also be encouraged. Both aspects will increase cooperation between park authorities and local people, and can reduce the need for expensive anti-poaching measures.
- Management of wild resources should be devolved to the local, community level as much as possible. Support should be given to the development of local institutions for common property resources and to the equitable sharing of benefits from their utilisation.

Hidden Harvest policy recommendations

- 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 use, ownership and benefit sharing and must ensure that rights of access and control are secured for those communities which are knowledgeable about and have played a crucial role in managing these resources.

Valuation methodology

- The economic benefits of wild resources must be assessed in a more comprehensive manner to improve the decision-making basis for policymakers and land use planners. Economic benefits based on the use of wild resources should be situated and evaluated in a total livelihood context.
- Combining economic concepts with participatory research allows for a more comprehensive valuation of wild resources, recognising not only the financial value, but also the indirect and non-use values. Extending the use of participatory valuation can be achieved through context-specific training for practitioners from relevant disciplinary backgrounds, such as environmental impact assessment, environmental economics, and agricultural research and extension.
- The local-level valuation methodologies being developed should be made accessible to local communities to enable them to negotiate with powerful external interests and to enhance local natural resource management structures.

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Scoones, I., Melnyk, M., and Pretty, J.N. (1992). *The Hidden Harvest: Wild Foods and Agricultural Systems: A Literature Review and Annotated Bibliography*. International Institute for Environment and Development, Swedish International Development Authority and World Wide Fund for Nature, London and Gland. Price £12.95

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The Hot Springs Working Group. (1995). *Local-Level Economic Valuation of Savanna Woodland Resources: Village Cases from Zimbabwe*. Sustainable Agriculture Research Series, Vol. 3, No. 2., International Institute for Environment and Development, London. Price £5.00

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