International
Institute for
Environment and
Development
Natural Resources Group
and Sustainable Agriculture
and Rural Livelihoods
Programme

GATEKEEPER SERIES NO. 115

Biodiversity planning: Why and how should local opinions matter?

Sonja Vermeulen

2004

THE GATEKEEPER SERIES *of the Natural Resources Group at IIED is produced by the Sustainable Agriculture and Rural Livelihoods Programme. The Series aims to highlight key topics in the field of sustainable natural resource management. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions for development that are particularly relevant for policymakers, researchers and planners. References are provided to important sources and background material. The Series is published three times a year and is supported by the Swedish International Development Cooperation Agency (Sida) and the Swiss Agency for Development and Cooperation (SDC). The views expressed in this paper are those of the author(s), and do not necessarily represent those of the International Institute for Environment and Development (IIED), The Swedish International Development Cooperation Agency (Sida) and the Swiss Agency for Development and Cooperation (SDC), or any of their partners.*

SONJA VERMEULEN is a Research Associate in the Forestry and Land Use Programme at the International Institute for Environment and Development (IIED), London. Her main areas of work include political and institutional mechanisms to tackle inequality in forest and land management; policy tools for marginalised managers of natural resources to make greater impact; refinement of our perceptions of biodiversity and other ecological services into negotiable concepts; and changing roles of the private sector in forestry, especially contracts and collaborations between companies and local people. She can be contacted at IIED, 3 Endsleigh St, London WC1H 0DD. Telephone +44 (0)20 7388 2117; Fax +44 (0)20 7388 2826; E-mail sonja.vermeulen@iied.org.

EXECUTIVE SUMMARY

Many planning processes for land management or natural resource management now include specific provisions for 'biodiversity'. But biodiversity is a fuzzy concept, with different meanings for different people. Biodiversity discourse is also impassioned and political, making it all the more difficult for non-specialists tasked with biodiversity planning to work out what kinds of conceptual frameworks or processes to use. Although progress has been made recently to elucidate and respect the immediate connections between biodiversity and the people who live with it, for example at the World Parks Congress in 2003 (WPC, 2003), to many people the concept of biodiversity remains tied up with conservation, particularly with 'global public good' conservation priorities such as protecting globally rare species and habitats. Locally relevant biodiversity issues get much less attention – to the extent that biodiversity planning processes may not even know how to ask the right questions at the local level.

The aim of this *Gatekeeper* is to provide basic guidance on the different facets and values of biodiversity and how these matter to different interest groups. Most emphasis is put on the level of communities who live with biodiversity, to point out some of the local contexts and choices that external agents may want or need to incorporate in biodiversity planning processes. The text is aimed at non-biodiversity specialists and is based on common questions that arise around the multiple meanings of biodiversity. The topics covered include:

- Unpacking what is meant by biodiversity and its different values (Section 2);
- An overview of the broad interest groups in biodiversity (Section 3);
- Global public good values versus typical local community values (Section 4);
- Interactions between people and biodiversity (Section 5);
- Differences within communities in how biodiversity is used and valued (Section 6); and
- A simple framework and checklist for incorporating local biodiversity values in planning (Section 7).

Each of these sections concludes with a short summary of general guidance for people involved in biodiversity planning who wish to include local opinions more effectively.

BIODIVERSITY PLANNING: WHY AND HOW SHOULD LOCAL OPINIONS MATTER?

Sonja Vermeulen

1. MULTIPLE VALUES OF BIODIVERSITY

Biodiversity means different things to different people: both its *definition* and its *value* depend on the person using the term. The term 'biodiversity' was only created in 1986[1]. According to the Convention on Biological Diversity (1992), it refers to 'the variability among living organisms from all sources including, among other things, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems'. This definition represents the scientific, Western understanding of biodiversity that dominates international debate and major funding allocations for biodiversity management. Less frequently heard voices, such as those of local communities, may hold different views of what characterises biodiversity – or what might more commonly be called 'nature', 'fauna and flora' or 'living things'.

The term 'biodiversity' is often used as a simple synonym for ecosystems and organisms. But diversity itself matters. Biodiversity refers to the living world's capacity to change – variability – and the range of biological forms and processes that derive as a result – variety. In this sense, what is important about biodiversity to humans is the *choice* that it offers, from the perspective of both the present benefits of varied and variable life forms and the future options associated with variety and the capacity of organisms to mutate and adapt.

The mantra of modern society is that biodiversity is good. Land-use options and management practices that increase biodiversity should be favoured. But a moment's thought shows that more biodiversity is not always better. The genetic distinctiveness of the human immuno-deficiency virus (HIV), or the endless

1. By two American scientists, Walter Rosen and Edward Wilson, in the preparation and later proceedings of the first 'National Forum on BioDiversity'.

proliferation of fungal crop diseases, are increases in diversity we would prefer not to have. Similarly, while local and global declines in biodiversity are escalating and need urgent action, biodiversity is not *only* about threats and loss. For example, biodiversity has increased in agricultural landscapes where farmers have stopped using inorganic fertilisers, and in natural landscapes with strategic fire management. Biodiversity is an emotive issue – moving on from the simple notion that 'more biodiversity is good' and instead looking at the actual ways that we gain from it is a constructive starting point for effective biodiversity decision-making.

One useful way of appreciating the significances of biodiversity to society is to tease out different categories of value. The general consensus in international dialogue is that these values fall into three categories:

- *Direct-use values* of biodiversity accrue from the benefits of a wider range of raw materials (e.g. foodstuffs, medicines, building materials and fodder for livestock). Often the most valuable direct-use values of diversity itself, as opposed to natural resource availability more generally, are associated with supply of infrequently used resources during critical periods of time when staples are not available (e.g. dry seasons or droughts).

- *Indirect-use values* of biodiversity are mostly associated with the environmental services that ecological biodiversity sometimes enhances. More diverse ecosystems may be better providers of stable and effective microclimate regulation, protection from erosion, or other services – though scientific evidence on these issues remains mixed. A perhaps underestimated indirect-use value of greater biodiversity is protection from predators, parasites and diseases.

- *Non-use values* of biodiversity consist primarily of options to use biological resources in the future (*option value*), either during our own lifetimes or in future generations (*bequest value*). More diverse communities of plants and animals offer a greater variety of potential future uses as well as a greater capacity to evolve new forms and processes. Biodiversity also has a non-use *cultural value* in terms of its roles in our shared sense of history and place in the world. Some people argue that another non-use value, the *intrinsic value* of non-human species' right to existence, overrides all other biodiversity values.

Guidance:

- People understand biodiversity in many different ways. Importantly, biodiversity includes an appreciation of the richness of life on earth and capacity for change in species and ecosystems – and how these give us choice.
- The basic dependence of humans on nature is obvious. Our dependence on a *diversity* of organisms and ecosystems is far less straightforward.
- The value of biodiversity to society includes our daily use of natural resources and dependence on biological variety, our desire to sustain nature into the future, and cultural and intrinsic significances of organisms and ecosystems.

2. KEY BIODIVERSITY INTEREST GROUPS

The key biodiversity interest groups at any given locality can be broadly divided into

- *Government*: legislative and policymaking bodies and implementing agencies
- *Environment*: conservation organisations
- *Community*: local residents and representative bodies
- *Private sector*: resource use or extraction businesses

Various patterns of interaction, overlap, synergy and conflict are possible among these interest groups. Internally too the broad interest groups do not of course represent united interests. Government can include agencies at different levels (e.g. national versus district) or in different sectors (e.g. water versus forestry) that have conflicting mandates. Different environmental interests may prioritise different aims and hence advocate competing land uses. Environmental interests also include research institutes – which can lay special claim to certain areas or call for exclusive access by biologists (Guha, 1997). Community interests are likely to be the least homogenous (see Section 6 on differences within communities).

The strength and legitimacy of the claims of each of the interest groups over biodiversity depend on a set of factors that might, depending on context, include: legal rights and obligations, historical associations or precedence, traditional and informal rights, degree of dependency, record of responsible management, and relative distance from key biodiversity areas to sites of residence or livelihood activities. The relevance of each of these factors is open to debate, and different people will interpret them differently. Ultimately the success of interest groups in establishing their claims – and achieving the outcomes they desire – will depend primarily on their power in the local decision-making arena. In general, community interests

will be the least powerful of the interest groups, and will be represented by the weakest voice.

An objective appraisal of the relative weight of different claims is not possible – all measurements and expressions of biodiversity are value-laden. Since biodiversity can never be fully measured, even scientific approaches to biodiversity assessment and priority setting are always underpinned by value judgements.[2] Interest groups' understandings of biodiversity can furthermore be so different that they cannot be quantitatively, or even qualitatively, reconciled. Indeed, it may in some cases be more productive during stakeholder dialogue to discuss a more tangible substitute for biodiversity at large, such as scenarios of alternative land uses or management practices. These approaches will be particularly apt in cross-cultural dialogue with local communities.

Guidance:

- All biodiversity decisions, including those based on science, are value-laden. The legitimacy of stakeholder claims will always be subject to debate. Power dynamics are likely to be a major factor in biodiversity decision-making.
- Key biodiversity interest groups at local level will include the government (possibly as a 'policy context' rather than an active presence), environment, community and private sector – in various combinations and alliances.
- Due to different understandings of nature, it may be difficult to discuss biodiversity directly with different groups. For example, in consultations with communities, it may be easier to discuss 'land use' options rather than 'biodiversity' options.

3. GLOBAL (ENVIRONMENT) VERSUS LOCAL (COMMUNITY) BIODIVERSITY VALUES

Within an overall emphasis on conservation, global biodiversity values focus on global rarity of species and ecosystems, wild rather than agricultural biodiversity, and scientific measures of abundance and difference, based on a genetic understanding of concepts such as species[3] instead of qualities more obviously apparent to non-biologists. Rural communities with a high level of direct dependence on a variety of local natural resources may prioritise rather differently than outsiders

2. E.g. standard measures such as species counts require a choice of what species to count – and mycologists and bacteriologists, for example, complain that their species of interest are consistently under-represented (Hawksworth and Ritchie, 1993).

3. In biological terms, two species are distinct if they are unable to produce fertile offspring through cross-mating.

Table 1. Differences between global and local biodiversity values

GLOBAL	LOCAL
Indirect-use and non-use values are primary concerns	Direct-use values as important or more important than indirect-use and non-use
Ideal of conservation, with or without sustainable use	Ideal of sustainable use, with or without conservation benefits
Usually no specified user groups	Specific user groups gain specific benefits
Endemics (species that occur locally only) and other rare species given high values	Endemics no more important than other species
Focus on genotypes (genetic information)	Focus on phenotypes (observable qualities)
Wild and agricultural diversity treated separately	No clear boundary between wild and agricultural biodiversity

Source: Vermeulen and Koziell, 2002

(see Table 1). Biodiversity is likely to be most highly prized for its contributions to daily needs, with specific knowledge and perceptions relevant to different user groups (e.g. farmers, hunters, herbalists). In contrast to the global conservation distinction of wilderness[4] versus human landscapes – and clear prioritisation of the former – local biodiversity-dependent communities tend not to distinguish or prioritise natural versus managed ecosystems or wild versus agricultural biodiversity (Blench, 1997).

The general importance that biodiversity-dependent communities attach to use of biodiversity does not mean that they are insensitive to non-use values. Non-use, cultural and intangible values of biodiversity are not held only by indigenous groups, or only in wealthy countries where people can afford to satisfy aesthetic ideals. Many people value nature for beauty, for their children's futures, or for its own right to exist independent of humans. Formal studies have found that people in wealthy and poor countries alike, or in urban versus rural settings, hold indistinguishable attitudes to nature and conservation (Van den Born *et al.*, 2001; Bandaral and Tisdell, 2003).

Of course, not all rural communities or social groups depend on or value local biodiversity. Environment interests, local or global, can be pitted against local development interests. The benefits of conservation projects based on global priorities (e.g. protection of globally rare species and ecosystems) are reaped globally – or, some would argue, differentially by wealthy interest groups who are better able to

4. Defined by Conservation International as areas with a population density of less than five people per square kilometre.

shape conservation agendas and to enjoy the leisure opportunities that protected areas offer. On the other hand, the costs of conservation are borne primarily by local communities: the opportunity costs of foregoing infrastructural and industrial development, as well as agriculture and natural resource use, or even eviction from ancestral homes and loss of life to wild animals (Ghimire and Pimbert, 1997; Rajpurhit, 1999). Conservation can create or accentuate social and economic inequalities(Blaikie and Jeanrenaud, 1997). Exclusionary conservationist land uses such as strictly protected areas can have deleterious effects on local livelihoods that in turn are linked to environmental degradation (Ghimire, 1994). The World Parks Congress of 2003 was proud to announce that 12% of the world's land surface is now protected – as much as is under agriculture. But it is estimated that several million people have been made refugees through the gazetting of protected areas in Africa alone (Geisler and de Souza, 2001), and people continue to be displaced and impoverished through external conservation initiatives (Cernea and Schmidt-Soltan, 2003).

Guidance:

- Environmental interests represented by international conservation organisations promote the conservation of organisms and ecosystems to protect non-use values of biodiversity with benefits that accrue globally in the future.
- Biodiversity-dependent communities tend to value present use above preservation for the future, and prefer not to distinguish between wilderness and human ecosystems.
- Global conservation priorities are not always compatible with local priorities for biodiversity management, because communities are expected to bear a disproportionate share of the costs of conservation.
- Local environment and conservation organisations can offer a useful bridge between global and local perspectives on biodiversity management

4. LINKS BETWEEN COMMUNITIES AND THEIR ENVIRONMENTS

People and their environments are inextricably linked – but not in harmony. Wilderness unaffected by human activity is impossible to find. Even before the rapid ascent in global warming, from which neither land nor sea can escape, people modified ecosystems heavily. Our belief in untouched landscapes and virgin forest has been refuted for pre-colonial North America, West Africa and Amazonia (Denevan, 1992; Fairhead and Leach, 1995; Lopez-Zent, 1998). Likewise, the myth that humans are, or have ever been, 'noble savages' at one with nature, is demonstrably untrue (Johnson, 1989; Redford, 1990; Alvard, 1993; Stearman, 1994). Nonetheless, people from all cultures depend on biodiversity and express

strong links to landscapes, flora and fauna (Van den Born *et al.*, 2001) – and support the principle of conservation even when they stand to lose out from conservation interventions (Ite, 1996; Hill, 1998; Mclean and Stræde, 2003).

Some people–biodiversity interactions take place across large areas. Crops, livestock, fish, medicines, cultivated and wild horticultural plants, and plant oils are all traded internationally, so consumer preferences can impact on biodiversity thousands of kilometres away without buyers realising it. Local impacts on and appreciation of biodiversity are more immediate. Much has been written, for example, on the immense detail of local knowledge about biodiversity held by some local communities, especially those with a long historical association with their environment (Laird, 2002). Detailed understandings of the ways in which local communities use and depend on biodiversity have also been developed in recent decades (Campbell *et al.*, 2002).

Much less is known about local communities' choices, preferences and priorities for biodiversity. In general, they are simply not asked. Their 'values' of biodiversity are assessed by observing use and management patterns. In places where local institutions have a poorly developed power base, biodiversity decisions that have local impacts are often made externally, without the participation and consent of local people. As well as being undemocratic, these kinds of decisions can have negative consequences for conservation (as well as for local priorities, as discussed in Section 1). For example, a major risk with conservation projects designed externally by conservation organisations, central governments and the private sector is that they will fail in their conservation objectives by actively undermining existing local conservation practices – as has been found for example in the Kenyan savanna and Amazonian rainforest (Smith, 1993; Zimmerman, 2001).

Guidance:

- Human interference in ecosystems is so comprehensive that no landscapes can be described as 'pristine' or 'virgin'. We call landscapes dominated by indigenous species 'wild' or 'natural', but in no case does this mean that they have avoided human impact.
- Communities, even indigenous communities, are seldom in harmony with their environments. But almost all will have opinions on and priorities for biodiversity, often pro-conservation, which are a good starting point for biodiversity management.
- Biodiversity values are not only about *use* and *knowledge*, but also about *choices*. If you want to know local people's preferences, ask them.
- Conservation, local development and people's rights are all at risk if local people are left out of biodiversity decision-making.

5. DIFFERENT INTERESTS WITHIN LOCAL COMMUNITIES

The term 'community' implies a homogeneity that masks the many different uses and values of biodiversity among different people in the community. Some broad social stratifications are obvious, for example that beekeepers will value diversity in flowering plants while agriculturalists may be anxious about diversity of crop diseases. In practice, of course, each community is unique. With this warning in mind, this section discusses some of the likely distinguishing features of interest groups within rural communities that have a high direct dependence on local natural resources.

Indigenous versus *non-indigenous people*. Differences between indigenous and non-indigenous communities' use of biodiversity can be complex. For instance, a careful review of multiple studies in South America found that indigenous hunters harvested a greater variety of wildlife species and had higher harvest rates than non-indigenous hunters, but that their impacts on wildlife habitats were lower (Redford and Robinson, 1987). Views on biodiversity can of course differ markedly between indigenous and non-indigenous groups. Theories of the universe that regard humans as only one link, unique but not superior, in the web of nature, are especially common among indigenous peoples (Murray, 2003). So too is detailed knowledge about local ecosystems and organisms (often called 'indigenous knowledge' or 'traditional knowledge') – though relevant local knowledge includes not only ecological understanding but the full suite of information and wisdom that helps local people claim their rights over local resources (e.g. intelligence on private sector and government threats to those claims) (Brosius, 2004).

Indigenous peoples often reject concepts of land or resource ownership – but paradoxically may have legally recognised rights over ancestral lands that give them greater security than non-indigenous settlers in the same area. Settler groups may on the other hand enjoy higher social standing, preferred treatment by local government agencies and more extensive social networks in other districts, towns and cities (Phi, 2003). Indigenous groups are often marginalised within local society and even ashamed to discuss their practices. In Kalimantan, Indonesia, for example, eating sago is so strongly associated with 'backwardness' that those who do are reluctant to talk about it, saying only that sago was eaten 'in the old days' (Sheil, 2002).

Poorer versus wealthier people – A common pattern in rural communities is a decreasing level of dependence on local wild biodiversity with increasing household wealth (compared to dependence on other subsistence and income sources),

but a rising level of control over and access to biodiversity resources among wealthier families. An international review of access issues and market opportunities for a wide range of non-timber forest products (e.g. fruits, honey, bamboo, rattan, small game, medicines) found that the poorest people in a community had limited access. Middle-income groups were most dependent on revenues from these products, while it was the richest who extracted greatest quantities (Belcher, 2003). Poorer families are especially dependent on biodiversity that has not been privatised but is rather a common property resource, managed through a system of local rules. Forest resources in particular can act as a 'safety net' for poor groups, providing stopgap food in years of bad harvest, or immediately accessible cash from timber when family emergencies occur (Angelsen and Wunder, 2003). Wealthier families within a community, on the other hand, may be able to grow and manage a wider range of biodiversity. For example, a study in Vietnam found that rice species biodiversity was higher in the paddies of richer households who prized taste and variety. For poorer families the main challenge was to grow enough food per year, so they relied on single high-yielding, imported rice strains (Canh, 2003).

Men versus women – In many rural communities, tasks associated with biodiversity use and management are strictly gender-segregated. For example, in Zimbabwe, women cultivate their own fields of subsistence crops, labour in men's fields of cash crops, keep goats and chickens, and collect firewood, wild vegetables, fruit, mushrooms and medicinal herbs for daily use. Men cultivate cash crops (mainly dependent on women's labour inputs), keep cattle, dogs and donkeys, hunt small game, and collect honey. Men have different access to, and knowledge of, biodiversity than women. Gender differences in attitudes can also be marked; for example, a study in Uganda found that women are far more likely to describe elephants as dangerous, even if they have never seen one (Hill, 1998). These stark gender differences can have social ramifications beyond the individual. Using the Zimbabwean example again, households headed by women have very different strategies for earning incomes from natural resources than do male-headed households (Campbell *et al*., 2002). In a country where female-headed households are increasingly the norm in rural areas, as more men migrate to seek work in cities or mines and AIDS causes untimely deaths, the implications at the community and national level for both livelihoods and biodiversity may be profound.

Individuals versus communities – Dependence on and significance of biodiversity is not just particular to social groups – specific individuals often have entirely personal priorities and knowledge. Many communities rely on key individuals,

often herbalists or traditional healers, as the source of knowledge for the names, distribution, dynamics and uses of local fauna and flora, as this example from Nigeria makes clear:

> Diverse crop cultivation in one village in Nigeria: Bolstered perhaps by cassava as a dependable market staple, individual farmers grow their favourite crops to an increasing extent…There were many idiosyncrasies: the pastor of the Cherubim and Seraphim church was the only man still growing an old variety of cassava; several farmers specialised in indigenous tobacco; an older man produced large quantities of vegetable seed to sell to urban gardeners; a young returnee from Lagos was the only farmer in his area producing a large crop of cow peas; one man had specialised in tangerines; and another had given part of his forest farm over to water yam, which is not a kind that can be pounded and is not highly regarded, even though the tubers can grow very large (Guyer, 1996).

A key point here is how human society maintains and gains from biodiversity at a community level, not just at an individual level. With one expert on medicinal plants, the whole village benefits; each household in a Nigerian village potentially has access to the specialist crops that certain individuals produce. Biodiversity management interventions therefore have to be thought through at a community and landscape level.

Past versus future – Also important is the dynamic nature of biodiversity at the community level, not only in terms of ecosystem dynamics, but also changing patterns of use, management, outside influences and value. In the Muyuy area of Peru, for example, a history of economic booms and busts has placed a succession of different pressures on biological resources. In the early 20th century a firewood boom for powering steamships led to the near extinction of the four main timber species, then the Second World War brought an industrial lubricant and leather boom, putting pressure on turtle eggs, jaguars and other large mammals. In the 1970s the petroleum boom led to urbanisation and the collapse of the sugar cane industry, which was subsequently rebuilt through the 1980s. Local people have responded to these changes with a series of technological and market innovations, such as propagation of indigenous tree species, mixed forest farming, and small-scale trading of produce in urban areas (Pinedo-Vasquez , 2001).

Guidance:

- Different social groups within a community can differ in their *use* of, access to, *knowledge* of, and *choices* for biodiversity. These differences need to be established at site level – with sensitivity to local rights over both resources and knowledge.
- Individual use, access, knowledge, opinions and priorities have impacts on the family and often on the whole community.
- Biodiversity choices by communities change over the years.

6. A SIMPLE FRAMEWORK FOR INCLUDING LOCAL VALUES IN BIODIVERSITY PLANNING

Many approaches to biodiversity assessment and planning that are used or advocated by different sectors place a far greater emphasis on global conservation values than on local values of biodiversity (Vermeulen and Koziell, 2002). This is not typically a deliberate oversight; agencies tasked with biodiversity planning often lack the means rather than the will to incorporate local opinions. They may also need to find an approach that placates the various interest groups in dispute over biodiversity and land. Of course no single methodology will be appropriate everywhere. On the other hand, a simple – and widely legitimised – framework for biodiversity planning that incorporates multiple values is provided by the CBD.

The Convention on Biological Diversity (CBD) is one of the 'Rio Conventions', established at the Earth Summit in Rio de Janeiro in 1992 and ratified by 175 national governments. In broad terms, the CBD has three overarching objectives:

- Conservation of biodiversity
- Sustainable use of biological resources
- Equitable sharing of the benefits of biodiversity[5]

Importantly, the objectives remind us that biodiversity management is about more than pure conservation exercises (the CBD also acknowledges in its preamble that the priority of developing countries is poverty reduction). In particular, the third objective stresses the importance of equity in biodiversity outcomes, recognising that, at present, the costs and benefits of biodiversity are not shared equally throughout society. Wealthy countries have larger ecological footprints

5. In the strict legal sense, this objective was designed to ensure that biodiversity-rich countries would be adequately compensated for extraction of genetic resources – but today it is usually interpreted as a broader principle of equity at local as well as international levels (e.g. in Recommendation 29 of the World Parks Congress in 2003 – see WPC, 2003).

(Wackernagel *et al*., 1997) while rural communities in tropical countries bear the bulk of the costs of conserving globally valued biodiversity (Ghimire and Pimbert, 1997; WPC, 2003).

At local level the third objective of the CBD, read to include all components of biodiversity rather than genetic resources alone, has two implications: recognition of the relative costs and benefits of biodiversity to the local community relative to external stakeholders, and an understanding of biodiversity in a broader sense than its immediate biological features. Access is as important as abundance in determining availability of biodiversity – and hence the capacity to benefit from biodiversity – to local and external interest groups. Thus locally relevant biodiversity

Table 2. Checklist of possible local biodiversity issues

Access

- Local land rights: legal ownership of different land types, customary ownership, distribution among communities and among/within households
- Local resource access rights: bye-laws, rights of access (e.g. seasonal use of privately owned fields), formal or unspoken rules on use and management

Non-use values

- Environmental services: perceived roles in microclimate regulation, air and water purification, regulation of water flows (both floods and dry season flows), nutrient cycling, pollination, dispersal, disease control
- Cultural, spiritual and future option values: sacred, heritage and social values associated with nature, landscape beauty, recreation, cultural events and significance of land types and species

Knowledge

- Taxonomic and ecological knowledge: species names and distribution patterns; habitat classification, detailed life-cycle and ecosystem knowledge
- Non-biological knowledge: knowledge of threats, rights, external policies and contexts and means to influence these

Uses

- Uses of land types: residential land, agricultural land, forest land, range land, wetlands, rivers, sea
- Uses of species and sub-species varieties: crops, livestock, wild flora and fungi, wild fauna

Risks and costs

- Costs : opportunity costs due to land allocation, labour and other costs associated with existing and proposed biodiversity management
- Risks: level of dependency on biological resources, availability of alternatives, threats to resources and to access

Choices

- Preferences for land use: stated preferences among alternative land-use and development options
- Preferences for biodiversity management: stated preferences for various conservation and sustainable-use management approaches, identification of opportunities and challenges

assessments need to investigate not just species densities and habitat types but resource rights, physical accessibility and substitutability. *Knowledge* is similarly a dimension of biodiversity and includes both biological understanding and the means to use this effectively. Equitable sharing of the benefits of biodiversity demands that the *costs* and *risks* associated with biodiversity management be shared equally too. Finally, just as external conservation agendas are based on deliberate choices and priorities, so local *choices* need to be taken seriously. Taken together, these factors suggest a checklist of issues for biodiversity planning that is sensitive to local as well as global opinions (see Table 2).

Guidance:

- We all depend on the constant use of a wide variety of organisms and ecosystems – people need to use. Our dependence will continue – biodiversity needs to be conserved. Rural communities in tropical countries bear most of the costs of conservation – benefits should be shared equitably.
- The CBD is based on these three principles of conservation, sustainable use and equitable sharing of benefits. It provides an internationally recognised and credible framework for biodiversity decision-making at site level.
- The CBD emphasises that biodiversity has non-biological dimensions, such as access and benefits. These should be integrated into biodiversity assessment and decision-making. A checklist of local biodiversity issues includes access, uses, non-use values, knowledge, costs and choices.

REFERENCES

Alvard, MS. 1993. Testing the "Ecologically Noble Savage" hypothesis: interspecific prey choice by Piro hunters of Amazonian Peru. *Human Ecology* 21: 355-387.

Angelsen, A. and Wunder, S. 2003. Exploring the forestry-poverty link: key concepts, issues and research implications. *CIFOR Occasional Paper 40*. Centre for International Forestry Research, Bogor, Indonesia.

Bandaral, R. and Tisdell, C. 2003. Comparison of rural and urban attitudes to the conservation of Asian elephants in Sri Lanka: empirical evidence. *Biological Conservation* 110: 327-342.

Belcher, B. 2003. *The role of non-timber forest products in local livelihoods*. Unpublished report. Centre for International Forestry Research, Bogor, Indonesia.

Blaikie, P. and Jeanrenaud, S. 1997. Biodiversity and human welfare. In: Ghimire, K.B. and Pimbert, M.P (eds). *Social change and conservation: environmental politics and impacts of national parks and protected areas*. Earthscan, London.

Blench, R. 1997. Neglected species, livelihoods and biodiversity in difficult areas: how should the public sector respond? *ODI Natural Resources Paper 23*. Overseas Development Institute, London, UK.

Brosius, P.T. 2004. What counts as local knowledge in global environmental assessments and conventions? *Address to conference Bridging Scales and Epistemologies: Linking Local Knowledge and Global Science in Multi-Scale Assessments*. Biblioteca Alexandrina, Alexandria, Egypt, March 17-20, 2004.

Campbell, B.M., Jeffrey, S., Kozanayi, W., Luckert, M., Mutamba, M. and Zindi, C. 2002. *Household livelihoods in semi-arid regions: options and constraints*. Centre for International Forestry Research, Bogor, Indonesia.

Convention on Biological Diversity 1992. Text of the Convention on Biological Diversity. http://www.biodiv.org/convention/articles.asp

Cernea, M.M. and Schmidt-Soltan, K. 2003. The end of forcible displacements? Conservation must not impoverish people. *Policy Matters* 12: 42-51.

Denevan, W. 1992. *The pristine myth: the landscape of the Americas in 1492. Annals of the Association of American Geographers* 82: 369-385.

Fairhead, J. and Leach, M. 1995. False forest history, complicit social analysis: rethinking some West African environmental narratives. *World Development* 23: 1023-1035.

Geisler, C. and de Souza, R. 2001. From refuge to refugee: the African case. *Journal of Public Administration and Development* 21: 159-170.

Ghimire, KB. 1994. Parks and people: livelihood issues in national parks management in Thailand and Madagascar. *Development and Change* 25: 195-229.

Guha, R. 1997. The authoritarian biologist and the arrogance of anti-humanism. The Ecologist 27: 14-20.

Guyer, JI. 1996. Diversity at different levels: farm and community in western Nigeria. *Africa* 66: 71-89.

Hawksworth, DL. and Ritchie, JM. 1993. *Biodiveristy and biosystematic priorities: micro-organisms and invertebrates*. CAB International, Wallingford, UK.

Hill, CM. 1998. Conflicting attitudes towards elephants around the Budongo Forest Reserve, Uganda. *Environmental Conservation* 25: 244-250.

Ite, U. 1998. New wine in an old skin: the reality of tropical moist forest conservation in Nigeria. *Land Use Policy* 15: 135-147.

Johnson A. 1989. How the Machiguenga manage resources: conservation or exploitation of nature. *Advances. Economic Botany*. 7: 213-222

Laird, S.A. (ed.) 2002. *Biodiversity and traditional knowledge: equitable partnerships in practice*. Earthscan, London, UK.

Lopez-Zent, E. 1998. A creative perspective of environmental impacts by native Amazonian human populations. *Intercienca* 23: 232.

Mclean, J. and Stræde, S. 2003. Conservation, relocation and the paradigms of park and people management: a case study of Padampur villages and the Royal Chitwan National Park, Nepal. *Society and Natural Resources* 16:509-526.

Murray, M. 2003. Overkill and sustainable use. *Science* 299: 1851-1853.

Phi, L.T. 2003. *Making the most of market chains: challenges for small-scale producers and traders in upland Vietnam*. Non-timber forest Products Research Centre, Forest Science Institute of Vietnam, Hanoi, Vietnam and International Institute for Environment and Development, London, UK.

Pinedo-Vasquez, M., Barletti Pasqualle, J. and Del Castillo Torres, D. 2001. *A tradition of change: the dynamic relationship between biodiversity and society in Sector Muyay, Peru*. Paper presented at the International Conference on Biodiversity and Society, Columbia University, 21-25 May 2001.
Rajpurhit K.S. 1999. Child lifting: wolves in Hazaribagh, India. *Ambio* 28: 162-166.

Redford (1990)Redford, K.H. and Robinson, J.G. 1987. The game of choice: patterns of Indian and colonist hunting in the Neotropics. *American Anthropologist* 89: 650-667.

Sheil, D., Puri, R.K., Basuki, I., van Heist, M., Syaefuddin, Rukmiyati, Sardjono, M.A., Samsoedin, I., Sidiyasa, K., Chrisandini, Permana, E., Angi, E.M., Gatzweiler, F., Johnson, B. and Wijaya, A. 2002. *Exploring biological diversity, environment and local people's perspectives in forest landscapes*. Centre for International Forestry Research, Bogor, Indonesia.

Smith, DL. 1993. Loss of the Amboseli ecosystem in Kenya. *Oryx* 27:1-2.

Stearman, A. 1991. Making a living in the tropical forest - Yuqui foragers in the Bolivian Amazon. *Human Ecology* 19(2): 245-260.

Van den Born, RJG., Lenders, RHJ., de Groot, WT. and Huijsman, E. 2001. The new biophilia: an exploration of visions of nature in Western countries. *Environmental Conservation* 28: 65-75.

Vermeulen, S. and Koziell, I. 2002. *Integrating global and local biodiversity values: a review of biodiversity assessment*. International Institute for Environment and Development, London, UK.

Wackernagel, M., Onisto, L., Linares, AC., Falfan, ISL., Garcia, JM., Guerrero, AIS., Guerrero, MGS. 1997. *Ecological footprints of nations*. Center for Sustainability Studies.
http://www.ecouncil.ac.cr/rio/focus/report/english/footprint/WPC 2003.
Recommendation 29: poverty and protected areas. World Parks Congress.
http://www.iucn.org/themes/wcpa/wpc2003/pdfs/outputs/recommendations/approved/english/html/r29.htm

Zimmerman, B. *et al*. 2001. Conservation alliances with tropical forest indigenous peoples. The case of the Kayapo of south-eastern Amazonia. *Environmental Conservation* 28: 10-22.

SUBSCRIBING TO THE GATEKEEPER SERIES

To receive the Gatekeeper Series regularly, individuals and organisations can take out a subscription. Subscribers receive nine Gatekeeper papers a year. Subscriptions are reasonably priced to subscribers based in OECD countries, and are free to individuals and organisations based in non-OECD countries.

For more details or to subscribe contact: IIED,

3 Endsleigh Street, London WC1H 0DD, UK
Email: subscriptions @iied.org
Tel: +44 020 7388 2117;
Fax +44 020 7388 2826, or complete the online order form at http://www.iied.org/

OTHER IIED PUBLICATIONS

For information about IIED's other publications, contact: EarthPrint Limited, Orders Department, P.O. Box 119, Stevenage, Hertfordshire SG1 4TP, UK
Fax: +44 1438 748844
mail to:
orders@earthprint.co.uk
There is a searchable IIED bookshop database on:
http://www.iied.org/bookshop/index.html

1. **Pesticide Hazards in the Third World: New Evidence from the Philippines.** 1987. J.A. McCracken and G.R. Conway.
2. **Cash Crops, Food Crops and Agricultural Sustainability.** 1987. E.B. Barbier.
3. **Trees as Savings and Security for the Rural Poor.** 1992. Robert Chambers, Czech Conroy and Melissa Leach. (1st edition, 1988)

4-12 Out of Print

13. **Crop-Livestock Interactions for Sustainable Agriculture.** 1989. Wolfgang Bayer and Ann Waters-Bayer.
14. **Perspectives in Soil Erosion in Africa: Whose Problem?** 1989. M. Fones-Sondell.

15-16. Out of Print

17. **Development Assistance and the Environment: Translating Intentions into Practice.** 1989. Marianne Wenning.
18. **Energy for Livelihoods: Putting People Back into Africa's Woodfuel Crisis.** 1989. Robin Mearns and Gerald Leach.
19. **Crop Variety Mixtures in Marginal Environments.** 1990. Janice Jiggins.
20. **Displaced Pastoralists and Transferred Wheat Technology in Tanzania.** 1990. Charles Lane and Jules N. Pretty.
21. **Teaching Threatens Sustainable Agriculture.** 1990. Raymond I. Ison.
22. **Microenvironments Unobserved.** 1990. Robert Chambers.
23. **Low Input Soil Restoration in Honduras: the Cantarranas Farmer-to-Farmer Extension Programme.** 1990. Roland Bunch.
24. **Rural Common Property Resources: A Growing Crisis.** 1991. N.S. Jodha.
25. **Participatory Education and Grassroots Development: The Case of Rural Appalachia.** 1991. John Gaventa and Helen Lewis.
26. **Farmer Organisations in Ecuador: Contributions to Farmer First Research and Development.** 1991. A. Bebbington.
27. **Indigenous Soil and Water Conservation in Africa.** 1991. Reij. C.
28. **Tree Products in Agroecosystems: Economic and Policy Issues.** 1991. J.E.M. Arnold.
29. **Designing Integrated Pest Management for Sustainable and Productive Futures.** 1991. Michel P. Pimbert.
30. **Plants, Genes and People: Improving the Relevance of Plant Breeding.** 1991. Angelique Haugerud and Michael P. Collinson.
31. **Local Institutions and Participation for Sustainable Development.** 1992. Norman Uphoff.
32. **The Information Drain: Obstacles to Research in Africa.** 1992. Mamman Aminu Ibrahim.
33. **Local Agro-Processing with Sustainable Technology: Sunflowerseed Oil in Tanzania.** 1992. Eric Hyman.
34. **Indigenous Soil and Water Conservation in India's Semi-Arid Tropics.** 1992. John Kerr and N.K. Sanghi.
35. **Prioritizing Institutional Development: A New Role for NGO Centres for Study and Development.** 1992. Alan Fowler.
36. **Out of Print**
37. **Livestock, Nutrient Cycling and Sustainable Agriculture in the West African Sahel.** 1993. J.M. Powell and T.O. Williams.
38. **O.K., The Data's Lousy, But It's All We've Got (Being a Critique of Conventional Methods.** 1993. G. Gill.
39. **Homegarden Systems: Agricultural Characteristics and Challenges.** 1993. Inge D. Hoogerbrugge and Louise O. Fresco.
40. **Opportunities for Expanding Water Harvesting in Sub-Saharan Africa: The Case of the Teras of Kassala.** 1993. Johan A. Van Dijk and Mohamed Hassan Ahmed.
41. **Out of Print**
42. **Community First: Landcare in Australia.** 1994. Andrew Campbell.
43. **From Research to Innovation: Getting the Most from Interaction with NGOs in Farming Systems Research and Extension.** 1994. John Farrington and Anthony Bebbington.
44. **Will Farmer Participatory Research Survive in the International Agricultural Research Centres?** 1994. Sam Fujisaka.
45. **Population Growth and Environmental Recovery: Policy Lessons from Kenya.** 1994. Mary Tiffen, Michael Mortimore and Francis Gichuki.
46. **Two Steps Back, One Step Forward: Cuba's National Policy for Alternative Agriculture.** 1994. Peter Rosset and Medea Benjamin.

47. **The Role of Mobility Within the Risk Management Strategies of Pastoralists and Agro-Pastoralists.** 1994. Brent Swallow.
48. **Participatory Agricultural Extension: Experiences from West Africa.** 1995. Tom Osborn.
49. **Women and Water Resources: Continued Marginalisation and New Policies.** 1995. Francis Cleaver and Diane Elson.
50. **New Horizons: The Economic, Social and Environmental Impacts of Participatory Watershed Development.** 1995. Fiona Hinchcliffe, Irene Guijt, Jules N. Pretty and Parmesh Shah.
51. **Participatory Selection of Beans in Rwanda: Results, Methods and Institutional Issues.** 1995. Louise Sperling and Urs Scheidegger.
52. **Trees and Trade-offs: A Stakeholder Approach to Natural Resource Management.** 1995. Robin Grimble, Man-Kwun Chan, Julia Aglionby and Julian Quan.
53. **A Role for Common Property Institutions in Land Redistribution Programmes in South Africa.** 1995. Ben Cousins.
54. **Linking Women to the Main Canal: Gender and Irrigation Management.** 1995. Margreet Zwarteveen.
55. **Soil Recuperation in Central America: Sustaining Innovation After Intervention.** 1995. Roland Bunch and Gabinò López.
56. **Through the Roadblocks: IPM and Central American Smallholders.** 1996. Jeffery Bentley and Keith Andrews.
57. **The Conditions for Collective Action: Land Tenure and Farmers' Groups in the Rajasthan Canal Project.** 1996. Saurabh Sinha.
58. **Networking for Sustainable Agriculture: Lessons from Animal Traction Development.** 1996. Paul Starkey.
59. **Intensification of Agriculture in Semi-Arid Areas: Lessons from the Kano Close-Settled Zone, Nigeria.** 1996. Frances Harris.
60. **Sustainable Agriculture: Impacts on Food Production and Food Security.** 1996. Jules Pretty, John Thompson and Fiona Hinchcliffe.
61. **Subsidies in Watershed Development Projects in India: Distortions and Opportunities.** 1996. John M. Kerr, N.K. Sanghi and G. Sriramappa.
62. **Multi-level Participatory Planning for Water Resources Development in Sri Lanka.** 1996. K. Jinapala, Jeffrey D. Brewer, R. Sakthivadivel.
63. **Hitting a Moving Target: Endogenous Development in Marginal European Areas.** 1996. Gaston G.A. Remmers.
64. **Poverty, Pluralism and Extension Practice.** 1996. Ian Christoplos.
65. **Conserving India's Agro-Biodiversity: Prospects and Policy Implications.** 1997. Ashish Kothari.
66. **Understanding Farmers' Communication Networks: Combining PRA With Agricultural Knowledge Systems Analysis.** 1997. Ricardo Ramirez.
67. **Markets and Modernisation: New Directions for Latin American Peasant Agriculture.** 1997. Julio A. Berdegué and Germán Escobar.
68. **Challenging 'Community' Definitions in Sustainable Management: The case of wild mushroom harvesting in the USA.** 1997. Rebecca McLain and Eric Jones.
69. **Process, Property and Patrons: Land Reform In Upland Thai Catchments.** 1997. Roger Attwater.
70. **Building Linkages for Livelihood Security in Chivi, Zimbabwe.** 1997. Simon Croxton and Kudakwashe Murwira.
71. **Propelling Change from the Bottom-Up: Institutional Reform in Zimbabwe.** 1997. J. Hagmann, E. Chuma, M. Connolly and K. Murwira.
72. **Gender is not a Sensitive Issue: Institutionalising a Gender-Oriented Participatory Approach in Siavonga, Zambia.** 1997. Christiane Frischmuth.
73. **A Hidden Threat to Food Production: Air Pollution and Agriculture in the Developing World.** 1997. F. Marshall, Mike Ashmore and Fiona Hinchcliffe.
74. **Policy Research and the Policy Process: Do the Twain ever Meet?** 1998. James L. Garrett and Yassir Islam.
75. **Lessons for the Large-Scale Application of Process Approaches from Sri Lanka.** 1998. Richard Bond.
76. **Malthus Revisited: People, Population and the Village Commons in Colombia.** 1998. Juan Camilo Cardenas.
77. **Bridging the Divide: Rural-Urban Interactions and Livelihood Strategies.** 1998. Cecilia Tacoli.
78. **Beyond the Farmer Field School: IPM and Empowerment in Indonesia.** 1998. Peter A. C. Ooi.
79. **The Rocky Road Towards Sustainable Livelihoods: Land Reform in Free State, South Africa.** 1998. James Carnegie, Mathilda Roos, Mncedisi Madolo, Challa Moahloli and Joanne Abbot.
80. **Community-based Conservation: Experiences from Zanzibar.** 1998. Andrew Williams, Thabit S. Masoud and Wahira J. Othman.
81. **Participatory Watershed Research and Management: Where the Shadow Falls.** 1998. Robert E. Rhoades.
82. **Thirty Cabbages: Greening the Agricultural 'Life Science' Industry.** 1998. William T. Vorley.
83. **Dimensions of Participation in Evaluation: Experiences from Zimbabwe and the Sudan.** 1999. Joanne Harnmeijer, Ann Waters-Bayer and Wolfgang Bayer.

84. **Mad Cows and Bad Berries.** 1999. David Waltner-Toews.
85. **Sharing the Last Drop: Water Scarcity, Irrigation and Gendered Poverty Eradication.** 1999. Barbara van Koppen.
86. **IPM and the Citrus Industry in South Africa.** 1999. Penny Urquhart.
87. **Making Water Management Everybody's Business: Water Harvesting and Rural Development in India.** 1999. Anil Agarwal and Sunita Narain.
88. **Sustaining the Multiple Functions of Agricultural Biodiversity.** 1999. Michel Pimbert.
89. **Demystifying Facilitation in Participatory Development.** 2000. Annemarie Groot and Marleen Maarleveld.
90. **Woodlots, Woodfuel and Wildlife: Lessons from Queen Elizabeth National Park, Uganda.** 2000. Tom Blomley.
91. **Borders, Rules and Governance: Mapping to catalyse changes in policy and management.** 2000. Janis B. Alcorn.
92. **Women's Participation in Watershed Development in India.** 2000. Janet Seeley, Meenakshi Batra and Madhu Sarin.
93. **A Study of Biopesticides and Biofertilisers in Haryana, India.** 2000. Ghayur Alam.
94. **Poverty and Systems Research in the Drylands.** 2000. Michael Mortimore, Bill Adams and Frances Harris.
95. **Forest Management and Democracy in East and Southern Africa: Lessons From Tanzania.** 2001. Liz Alden Wily.
96. **Farmer Learning and the International Research Centres: Lessons from IRRI.** 2001. Stephen Morin, Florencia Palis, Karen McAllister, Aida Papag, and Melina Magsumbol.
97. **Who Benefits From Participatory Watershed Development? Lessons From Gujarat, India.** 2001. Amita Shah.
98. **Learning Our Way Ahead: Navigating Institutional Change and Agricultural Decentralisation.** 2001. Clive Lightfoot, Ricardo Ramírez, Annemarie Groot, Reg Noble, Carine Alders, Francis Shao, Dan Kisauzi and Isaac Bekalo.
99. **Social Forestry versus Social Reality: Patronage and community-based forestry in Bangladesh.** 2001. Niaz Ahmed Khan.
100. **Global Restructuring, Agri-Food Systems and Livelihoods.** 2001. Michel P. Pimbert, John Thompson and William T. Vorley with Tom Fox, Nazneen Kanji and Cecilia Tacoli.
101. **Social Networks and the Dynamics of Soil and Water Conservation in the Sahel.** 2001. Valentina Mazzucato, David Niemeijer, Leo Stroosnijder and Niels Röling.
102. **Measuring Farmers' Agroecological Resistance to Hurricane Mitch in Central America.** 2001. Eric Holt-Giménez.
103. **Beyond Safe Use: Challenging the International Pesticide Industry's Hazard Reduction Strategy.** 2001. Douglas L. Murray and Peter L. Taylor.
104. **Marketing Forest Environmental Services – Who Benefits?** 2002. Natasha Landell-Mills.
105. **Food Security in the Context of Crisis and Conflict: Beyond Continuum Thinking.** 2002. Benedikt Korf and Eberhard Bauer.
106. **Should Africa Protect Its Farmers to Revitalise Its Economy?** 2002. Niek Koning.
107. **Creating Markets with the Poor: Selling Treadle Pumps in India** 2003. Frank van Steenbergen.
108. **Collaborative Forest Management in Kyrgyzstan: Moving from top-down to bottom-up decision-making.** 2003. Jane Carter, Brieke Steenhof, Esther Haldimann and Nurlan Akenshaev.
109. **The Contradictions of Clean: Supermarket Ethical Trade and African Horticulture.** 2003. Susanne Freidberg.
110. **Risking Change: Experimenting with Local Forest Management Committees in Jamaica.** 2003. Tighe Geoghegan & Noel Bennett.
111. **Contract Farming in India: Impacts on women and child workers.** 2003. Sukhpal Singh.
112. **The Major Importance of 'Minor' Resources: Women and Plant Biodiversity.** 2003. Patricia Howard.
113. **Water For All: Improving Water Resource Governance in Southern Africa.** 2004. Emmanuel Manzungu.
114. **Food Industrialisation and Food Power: Implications for food governance.** 2004. Tim Lang.
115. **Biodiversity planning: Why and how should local opinions matter?** 2004. Sonja Vermeulen.

SUBMITTING PAPERS TO THE GATEKEEPER SERIES

We welcome contributions to the *Gatekeeper* Series from researchers and practitioners alike. The Series addresses issues of interest to policy makers relating to the broad area of sustainable agriculture and resource management. *Gatekeepers* aim to provide an informed briefing on key policy issues in a readable, digestible form for an institutional and individual readership largely comprising policy and decision-makers within aid agencies, national governments, NGOs and research institutes throughout the world. In addition to this primary audience, *Gatekeepers* are increasingly requested by educators in tertiary education institutions, particularly in the South, for use as course or seminar discussion material.

Submitted material must be of interest to a wide audience and may combine an examination of broad policy questions with the presentation of specific case studies. The paper should conclude with a discussion of the policy implications of the work presented.

Style

Gatekeepers must be short, easy to read and make simple, concise points.

- Use short sentences and paragraphs.
- Keep language simple.
- Use the active voice.
- Use a variety of presentation approaches (text, tables, boxes, figures/illustrations, bullet points).
- Length: maximum 5,000 words

Abstract

Authors should also include a brief summary of their paper – no longer than 450 words.

Editorial process

Please send two hard copies of your paper. Papers are reviewed by the editorial committee and comments sent back to authors. Authors may be requested to make changes to papers accepted for publication. Any subsequent editorial amendments will be undertaken in consultation with the author. Assistance with editing and language can be provided where appropriate. All illustrations and graphs, etc. should be supplied separately in their original format (e.g. as jpeg files) as well as being embedded within documents. This will allow us to modify the images where necessary and ensure good reproduction of the illustrations in print.

Papers or correspondence should be addressed to:

Gatekeeper Editor
Sustainable Agriculture and Rural Livelihoods Programme
IIED, 3 Endsleigh Street,
London WC1H 0DD,
UK
Tel:(+44 020) 7388 2117;
Fax: (+44 020) 7388 2826;
e-mail: sustag@iied.org

iied

International
Institute for
Environment and
Development
Natural Resources Group
and Sustainable Agriculture
and Rural Livelihoods
Programme

Sida

DEZA
DDC
DSC
SDC
COSUDE

International Institute for Environment and Development
3 Endsleigh Street London WC1H 0DD
Tel: (+44 020) 7388 2117
Fax: (+44 020) 7388 2826
E-mail: sustag@iied.org
Website: http://www.iied.org/

June 2004
Design by Smith+Bell: andymss@aol.com
Printed by Russell Press, Nottingham, UK

THE NATURAL RESOURCES GROUP (NR Group) at IIED was set up as a way to bring together the work on natural resources being done by different parts of the institute, and to serve as a fertile ground for going beyond departmental or sectoral boundaries on these issues. The NR group comprises the following programmes at IIED: Sustainable Agriculture and Rural Livelihoods; Forestry and Land Use; Biodiversity and Livelihoods; Climate Change; Strategies, Planning and Assessment; and Drylands. The NR Group works on a gamut of natural resources issues, including water, assessment of natural resources, co-management, international conventions, and urban issues. The Group seeks to explore the development of socially and environmentally aware natural resources management through policy research, training and capacity strengthening, networking and information dissemination, and advisory services.

The **SUSTAINABLE AGRICULTURE AND RURAL LIVELIHOODS PROGRAMME** coordinates the editorial process for the Series. The Programme seeks to enhance and promote understanding of environmental health and equity in agriculture and food systems. It emphasises close collaboration and consultation with a wide range of institutions in the South. Collaborative research projects are aimed at identifying the constraints and potentials of the livelihood strategies of the Third World poor who are affected by ecological, economic and social change. These initiatives focus on the development and application of participatory approaches to research and development; resource conserving technologies and practices; collective approaches to resource management; the value of wild foods and resources; rural-urban interactions; and policies and institutions that work for sustainable agriculture.

The NR group receives funding from the Swedish International Development Cooperation Agency.

ISSN 1357-9258