BIODIVERSITY MANAGEMENT AND LOCAL LIVELIHOODS: RIO PLUS 10
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Despite the 1992 Rio Convention on Biological Diversity, the world's biological resources continue to be lost at an alarming rate, and particularly so in developing countries where many of the remaining resources are concentrated. Both inside and outside protected areas, biological resources, their management, and people's livelihood systems are complex and intricately inter-connected. While conventions are signed globally the implementation of provisions has to be local, and prospects for success depend on assessment of likely costs and benefits among stakeholders at various levels, and the resolution of conflict of interest among them.

Policy conclusions

- Biodiversity management and local livelihoods are integrated, complex and locally-specific. Understanding relationships in different situations is central to the design and implementation of rural development, poverty alleviation and biodiversity conservation initiatives.
- The use-values of biodiversity to local people, including the very poor, are often neglected. Understanding these, how they are accessed and by whom is central to the design and implementation of interventions.
- Conservation and development strategies must move away from simplistic assumptions that conservation and development are always mutually supportive. Where environmental change or conservation is involved there will also always be winners and losers.
- Biodiversity management in developing countries is not something that can be left solely to protected areas and high profile species as it has major implications for livelihoods more generally. As is now common in Britain, approaches to minimising biodiversity loss must have at heart an understanding of micro-economics and the use of farm-level incentives.
- This paper provides a framework for assisting in the planning of policies and interventions using a problem-centred and stakeholder approach for assembling and analysing information and developing a vision and plan for action. The approach needs to be tested and adapted to local situations and applied research in this area is urgently required.

A major challenge facing governments and other organisations is how to accommodate ecological concerns in rural development policies and programmes where conservation is not the primary aim. Bioresources play a critical role in the livelihood systems of many of the world's poor, even in highly modified or degraded landscapes.

A human perspective
By contrast with the *ecocentric* paradigm which suggests that all living species have an intrinsic value irrespective of any value that people derive from or attribute to them, the *anthropocentric* paradigm views biological resources as the collection of 'goods and services' that support human life. In this case conservation is necessary where depletion or degradation threaten future stocks of natural capital or endanger ecological functioning and life-support systems.

We take an anthropocentric position in this paper for two reasons:
- the paper is aimed at improving the design of interventions for rural development and hence improving the well-being of poor people on a sustainable basis. In this situation it follows that people-centred objectives take precedence over other considerations
- the ecocentric concept considers that all species have an intrinsic value irrespective of any value that people derive or attribute to them. It thus allows no rational way for making choices or prioritising between actions and so has little practical utility in development contexts

In taking our people-centred position we give central consideration to the values ascribed to bioresources by local people, and not just the regional or global concerns that remain the focus of much biodiversity discussion in developing countries. The management of bioresources by the poor is of central relevance to questions of poverty alleviation and policy development. It is crucial that the social groups most dependent upon bioresources should benefit from conservation efforts or be compensated adequately where effects are negative.

The values of biological resources
Bioresources have diversity and abundancy attributes (see Box 1) that provide a range of goods and services of benefit to people, and it is these goods and services that drive anthropocentric arguments for conservation. In economic analyses these goods and services are generally divided into *use* and *non-use values* (Table 1).

Use values can in turn be subdivided into *direct*, i.e. the physical goods used by people (such as food, fuel, timber, and herbal medicines) or aesthetic or recreational benefits obtained, and *indirect*, i.e. the ecological functions that maintain the stability and productivity of the environment at

Box 1 Biodiversity and biological resource terminology in a rural development context

Most scientific or formal definitions of biological diversity (biodiversity) focus on *diversity* itself, i.e. the variety of *different* living organisms (including genetic, species and ecosystem elements) in the world or a given land area. In practice, however, the concept is commonly used in a less precise way to denote the totality of nature – i.e. not just its *diversity* but also its *abundance* and the *ecological functions* that it performs.

In the context of rural development an exclusive focus on *diversity* of nature can underplay the importance of biological abundance: one bee, however rare it may be, is hardly important by itself and its value to pollination (and hence to people) lies in the fact that there are many millions of them. In practice the focus has led to an emphasis on saving endangered species, particularly prominent mammals such as whales and tigers, rather than less tangible but vital ecological functions (e.g. the contribution made to nutrient cycling, watershed protection and biosphere resilience) or more mundane bioresources of value to local people.

local and global scales. These include pollination functions performed by insects and bees, and contributions to nutrient cycling and fertility maintenance by soil organisms. At a wider level, trees and scrub vegetation contribute to environmental services such as soil conservation and hydrological protection and, more widely still, to regional (or global) climatic regulation.

The major *non-use values* are *option* and *existence values*. The former relate to potential future uses such as the availability of plant material for breeding or the possible discovery of new medicines, whilst the latter refer to the values placed on the continued existence and survival of rare and threatened species and ecosystems.

The distribution of values

In practice, many of these values are extremely difficult to measure and use, and the values ascribed are not *socially neutral*. In particular, local institutions such as property rights often give rise to differential access to and use of bioresources by different stakeholders, greatly affecting assessment of value. Weeds, for example, may be a serious impediment to settled cultivators while contributing much to the diet of landless people. The benefits derived from bioresources and the costs of their conservation can therefore be very unevenly distributed.

Similarly, the values of bioresources are dependent on the level or scale of analysis. Most (though by no means all) local values are utilitarian *direct use values* that provide immediate and practical benefits to local people. At a regional level, *direct use values* become less important compared with the *indirect values* of ecosystem functions and services. At the international and global scale, *non-use existence* and *option values* become critical, though questions of biosphere maintenance are also of vital importance.

As the benefits and costs of bioresources are distributed unevenly in society, it follows that the micro-economic impacts of interventions are also uneven. The nature of impacts depends on locally-specific factors such as the quality and availability of resources, the characteristics of local institutions, and the nature of environmental-livelihood patterns and interactions.

This analysis suggests the need to prioritise protection of those bioresources that provide benefits to local populations, especially the very poor. It also suggests the need to take full account of the opportunity cost of environmental change, and that the calculations are done not just at global, national or project levels but also from the viewpoints of those stakeholder groups directly concerned.

A brief history

The term biodiversity is relatively recent, becoming widely used only since the mid-1980s; prior to this, most approaches to conservation referred to nature or wildlife conservation.

An interest in conservation in developing countries grew in the colonial period when the early focus on hunting, game management and botanical gardens merged with a growing international interest in wildlife. In Africa many controlled hunting areas and game reserves were reclassified as national parks after 1945. The focus was on the establishment of protected areas in places of prime importance to biodiversity (e.g. the Amazon) or where high-profile animals or habitats were threatened (e.g. the Serengeti national park). As in the early years of nature conservation in the USA, most conservation followed a fortress approach that separated habitats and people; those living within the park boundaries were increasingly excluded from use of the natural resources on which they had previously depended.

This top-down and often globally-focused approach to conservation generally failed to protect wildlife as fully as intended and brought hardship to local communities. Since the mid-1980s, it has increasingly been replaced by a community-based approach aiming to work closely with local people, draw on their knowledge, and contribute to their livelihoods. For the most part conservation is, however, still concentrated in and around protected areas, nowadays often surrounded by buffer zones in which certain identified economic activities are permitted. The majority of rural people live in modified zones where agricultural and livestock systems predominate. In these areas biodiversity generally has limited global significance but is nevertheless of considerable use-value to the local poor. Recognition of its micro-economic values parallels the growth in conservation activities in agricultural circles in Europe where environmental conservation or enhancement has become a legitimate commercial operation (see Box 2).

Table 1 The economic values, benefits and beneficiaries of biological resources

Use values		Non-use values	
Direct use	Indirect use	Option	Existence
Consumptive Non-consumptive			
generic values: goods for home consumption, manufacture or trade non-tradable or subtractive	ecological functions for maintaining sustainability and productivity	possible future use or serendipity	satisfaction from knowledge of existence and ability to bequeath
example values from diversity: mixed crop varieties; mixed food combinations aesthetic value of diverse landscapes; some birdwatching	diversity of species assists ecosystem resilience and stability	gene pool; potential medicines and drugs	special concern for rare and threatened species and ecosystems
example values from abundance: food, fuel, fodder, raw materials birdwatching and recreation	carbon storage, nutrient cycling, photosynthesis, waste assimilation	future availability of resources	wilderness plenty and cultural and spiritual assets
example beneficiaries: poor rural people, especially women visitors and tourists of various kinds	downstream users of land, water, and energy; the world community	the young and future generations	environment lobbies and concerned people

Current integrative approaches

A number of different strategies for integrating longer-term environmental and developmental goals have recently been developed within the nexus of *sustainable development* in and for developing countries. The "new architecture" of aid aims to integrate poverty, environmental and economic growth policies into development frameworks and strategies owned and operated at country-level. It builds on earlier developments in participatory methodologies and involvement of local stakeholders in the design and (joint) management of programmes and projects at a local level. It also builds on progress in the mitigation and management of conflict, though it is noted that these issues are best addressed (and can be minimised or avoided) through identification and planning at the design stage of intervention. Examples of such initiatives include Comprehensive Development Frameworks, National Strategies for Sustainable Development, and Poverty Reduction Strategy Papers (see DFID SL Guidance Sheet No. 6 – forthcoming).

Encapsulating such initiatives are separate advances in sustainable livelihoods and ecosystem management that aim to balance social, economic and environmental objectives. Such approaches represent a converging of development and conservation ideals, both following a systems and integrative approach but looking at the situation from the other side of the same coin.

The current challenge is to find ways to operationalise this new architecture in ways that represent the interests of multiple stakeholders at global and local levels. In most cases where development or conservation initiatives are contemplated, decisions regarding matters such as the clearance or protection of forested land have to be made, implying trade-offs between short and long-term goals and conflicts of interest between stakeholder groups. The challenge is considerable, implying the need for appreciation of numerous people–ecosystem interactions and locally-variable political, social and institutional barriers. It also implies an understanding of the economic values of unmarketed goods and services and the difficulties of assigning and utilising these values in practice.

Box 2 Lessons from conservation experience in the UK

Over the centuries, the land of Britain has been managed for agriculture, forestry and other productive purpose and few if any landscapes were untouched by human activity. However, until the middle of the 20th century most landscapes, though different from their natural state, remained rich in bioresources. Further intensification in recent decades had serious repercussions on the environment.

In the 1990s a growing concern for biodiversity degradation, together with the need to avoid agricultural over-production, led to a number of agro-environmental schemes driven by farm-level incentives. Under schemes such as the Environmentally Sensitive Areas (ESA) and Countryside Stewardship (CS), farmers are paid for managing their land in ways that enhance the environment and its biodiversity.

Developing countries are not able to give the same priority to conservation objectives and, without massive external assistance, could not afford the costs of such schemes. As in Europe, however, biodiversity issues are often characterised by externalities where the costs of conservation are specific to the individual land managers while the benefits are passed on to others. The implication is the same: if farmers are to conserve bioresources for the wider good then prevailing institutions and financial incentives must reflect these priorities.

Grimble and Laidlaw, NRI in press

Challenges and barriers to progress

Although considerable progress has been made in the treatment of biological and other natural resources in a rural development context in the ten years since Rio, understanding has remained simplistic and analysis of who gains, who loses, and what incentives have to be in place is rarely undertaken. The assumption has been that conservation and development are mutually supportive and, when done in the right way, benefit all stakeholders alike (Grimble 1997).

To examine these issues more deeply requires detailed local knowledge but the costs of acquiring this are often unacceptably high in developing countries. They include:
- the difficulty of identifying options for bioresources conservation that can also sustain or enhance local livelihoods (and vice versa)
- the difficulty of taking account of locally-specific cost-benefit distributions in policy development and large-scale (national) projects and programmes

These difficulties put a premium on the development of simple, low-cost approaches for use at the design stage of interventions, to improve understanding of environment-livelihood interdependencies and the range of different interest between macro and micro stakeholders. Such approaches should improve predictability, reconcile different interests, and increase the likelihood of intervention success.

A framework for project design

Figure 1 presents a generic framework to assist in the planning of policies and interventions that incorporate the ideas discussed in this paper. It can be used in helping to prepare specific local actions working from broadly stated strategic goals. An essential feature of this framework is the adoption of a problem-centred stakeholder approach that incorporates early analysis of the perspectives and economic interests of different stakeholders, and the representation of these interests in intervention design. The approach comprises three stages:

Stage 1. Analysing the system
The starting point is an assessment of the local environment and people's interaction with it as a linked and inter-dependent system. The assessment would include:
- the range of bioresources found in the locality and access to them by different stakeholders
- the economic value of goods and services provided by bioresources
- the use and importance of these to different stakeholder groups, including the very poor
- the changes underway in the absence of intervention, and the shocks, stresses and impacts attributable to these
- the cost–benefit distributions of different types of environmental change
- the trade-offs between short and long-term management ideals and practices
- compatibilities and potential conflicts of interest between stakeholders at different levels

This problem-centred and systems-based approach can interface with work conducted by a range of disciplines in environment impact assessment and social and micro-economic analysis. It can also help identify the need for further information and hence prioritise investigation and research.

Stage 2. Developing a vision and plan for action
The second broad stage in the process considers the opportunities for intervention based on the above 'problem analysis', together with knowledge of the external resources available and the institutional and policy context impacting

on the system and influencing the room for manoeuvre. It is likely to be facilitated by a policy environment that is broadly hands-off, enabling and encouraging local-level decision making. The broad aims and objectives of intervention should also be prioritised at this stage, and anticipated impacts on different stakeholders identified.

The collection of information concerning the different values assigned to resources by different stakeholders and the potential conflicts and trade-offs this implies makes it easier to predict and deal with problems at the planning stage in several overlapping ways:

- it allows the early identification of potential problems and priorities between them
- it helps to avoid storing up problems for later
- it allows early consideration to be given to ways of dealing with problems that cannot be avoided
- it facilitates planning for reconciliation of different stakeholder interests at an early stage, before problems manifest themselves

An important element in the planning process is the effective representation of stakeholder interests in decision-making (particularly the resource-poor and those with little or no political voice) and the approach facilitates this. Understanding can be enhanced by direct participation (e.g. local committees and forums), by consensus building and the use of conflict resolution techniques.

Stage 3. Action planning, iteration and feedback

The third stage of the process is the action stage in which detailed activities or policy changes are planned, implemented and reviewed. While conceptually the logic of the planning process is sequential, in practice this stage is highly iterative and flexible. Thus it will be necessary to return to early steps in the process as new information and understanding becomes available, and to respond to newly identified problems and challenges. There is a danger that this outline framework might be used prescriptively, neglecting the fact that the steps overlap, interact and feed back to each other. The framework is not a mechanistic tool but rather a generic system for developing locally-specific, socially and environmentally sensitive interventions that help to solve socio-economic problems and provide maximum benefit from the conservation, management and use of biological resources.

Concluding thoughts

The paper has argued that rural development problems are closely related to those of the environment and, equally, environmental problems to those of livelihoods. Both sets of problems are complex, integrated and locally-specific, and devising solutions is highly information-demanding. While the paper has provided a conceptual framework for understanding the issues and ways of dealing with them using a problem-centred and stakeholder approach, low cost and practical mechanisms for treatment need to be worked through and adapted in specific local contexts. There is a critical need for detailed applied research in support of such local adaptation.

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Fig 1. A framework for preparing rural development initiatives with complex bioresource linkages and different local interests and perspectives
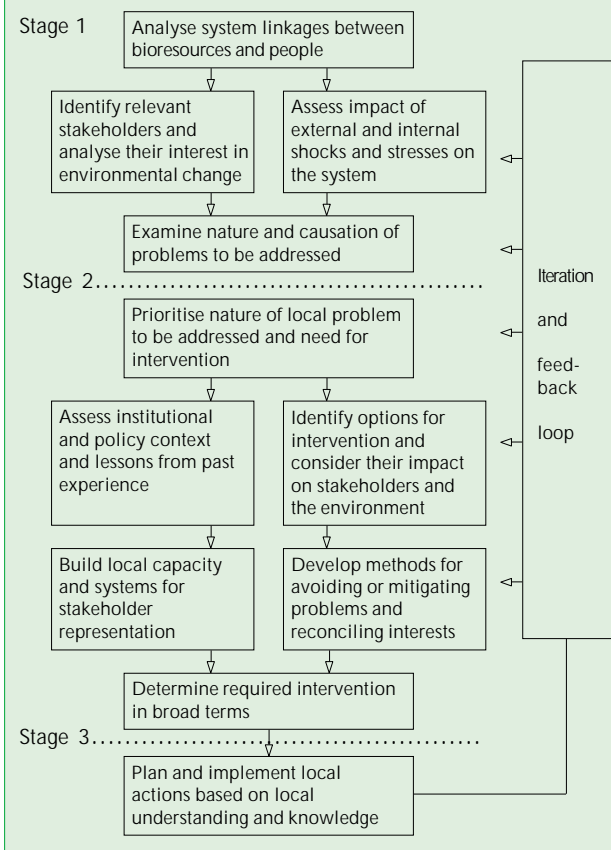
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