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Biological Resource Management

Integrating Biodiversity Concerns in Rural Development Projects and Programs

Robin Grimble
Martyn Laidlaw

January 2002

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THE WORLD BANK ENVIRONMENT DEPARTMENT

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Foreword

The idea for this study originated during my tenure as Chief of the Land, Water, and Natural Resources Division of the World Bank's Environment Department. It arose out of plans for a World Bank Handbook on Natural Habitats and Ecosystem Management and long-standing collaboration between the Bank's Environment Department and the Natural Resources Institute (NRI). The study was generously funded by the Natural Resources and Advisory Department of the Department for International Development (DFID) of the UK within the framework of its collaboration with multilateral agencies. Robin Grimble of NRI managed the study throughout.

The study examines the challenges that need to be addressed if we are to control environmental damage in the development process and sustain the essential contributions of biodiversity to ecosystem functioning and thereby people's livelihoods and rural development. The purpose is to identify ways by which biodiversity conservation can be mainstreamed in the planning activities and processes of national governments and development agencies such as the World Bank.

The primary focus of the study is the planning of rural development projects outside protected areas but it also concerns questions of biodiversity management at strategic and policy levels removed from the front line. Thus, apart from new projects and programmes, the study aims also to contribute to the development of country assistance strategies (CASs), national environmental action plans (NEAPS), sectoral investment programmes, and policy development more generally, both inside and outside the Bank.

The first drafts of the papers were presented to the World Bank and DFID in June 1998. The main findings were later presented (January 1999) at an Environmental Department workshop and subsequently reviewed by a multi-disciplinary peer review panel established by the Bank (November 1999). The papers were further discussed and revised to constitute this publication.

Colin Rees
Chief, 1993–98
Land, Water, and Natural Habitats Division
Environment Department

Preface

This study was commissioned by the Environment Department of the World Bank and funded by the British Department for International Development (DFID). It arose out of plans for a World Bank Handbook on Natural Resources and Ecosystem Management and long-standing collaboration between the Bank's Environment Department and the Natural Resources Institute (NRI) UK, including a contribution on Carrying Capacity (World Bank, 1996).

The aim of the study is to improve understanding of how biological resource conservation concerns can be better incorporated into projects and programs that primarily address the objective of rural development rather than environmental conservation. A multi-disciplinary study team was assembled and six background papers produced, along with the main overview paper. The six papers were:

1. Measuring biodiversity, predicting impacts, and monitoring change
2. Integrated pest management and biodiversity conservation
3. Biodiversity conservation in agricultural landscapes in Britain: relevant issues for developing countries
4. Reconciling biodiversity and development issues in practice: the search for a win-win situation in Ghana's coastal wetlands
5. Strategies for biodiversity conservation: examples from Tanzania
6. Participatory initiatives in biodiversity conservation: lessons from experience

A study was also made of World Bank policies and procedures relating to biodiversity management and rural development together with three portfolio reviews. The findings of this were not published separately but incorporated into the main paper.

The present paper is a distillation of findings from the various studies. It argues that bioresources and people's livelihood systems are intricately interrelated, and opportunities for intervention for development purposes must start from good understanding of different people's access to and use and management of these resources, and also the incentives, constraints and institutional factors governing the process. The paper identifies the necessary conditions and barriers to improvement, and develops an integrated framework for use in strategic development and the preparation of projects and programs.

The main findings of the study were presented by the NRI team at an Environment Department seminar in January 1999. Following further work the two volume draft report was peer reviewed by a multi-disciplinary panel established by the Bank (November/ December 1999). This overview paper takes full account of the detailed and valuable comments received but the views expressed are those of the authors who take final responsibility for content.

Life on earth has evolved into a unique, complex and beautiful phenomenon, in which there is both change and stability. The stability results from interlocking checks and balances, in which every species plays its role with little or no awareness of the true complexity of the biological, ecological and physical dynamics that constitute the system of which it is part. The rate and scale of human impact on the global ecology is such that it is now necessary to think about these system dynamics, and whether it is possible that our species could engineer its own decline or even demise. This is the challenge of sustainability.

Changes in the global ecology indicate that we need to become more aware of the consequences of our actions, and to start to manage our affairs more consciously than has been the case in the past. This may mean that it will be necessary to evolve new political and economic structures and decision-making mechanisms in order to respond to these emerging global demands.

— Anthony Clayton and Nicholas Radcliffe,
Sustainability: A Systems Approach (1996)

Acknowledgments

The idea for this study came from Colin Rees, then Chief of the Land, Water and Natural Habitats Division of the World Bank's Environment Department. We gratefully acknowledge generous help and support given by Colin himself, as well as, Gonzalo Castro and Gunars Platais, both of the Environment Department's biodiversity team. We should also thank the members of the peer-review panel for insightful comments, and Bank staff from the regional and technical departments with whom we consulted too numerous to mention individually.

We have also enjoyed and benefited from healthy debate with colleagues of the Natural Resources Institute (NRI) who sat on the advisory panel. We would like to thank the authors of six background papers: Tony Russell-Smith, Keith Shawe, Richard Zanré, Lia Van Broekhoven, Monica Janowski, and Richard Lamboll. Finally we would also like to thank Mike Morris (NRI), Izabella Koziell (DFID), and Felicity Proctor (DFID's representative in the Rural Development Department of the World Bank) for their support and helpful contributions to the paper's development.

The study was generously funded by the Rural Livelihoods and Environment Division of the Department for International Development (DFID) of the UK within the framework of its collaborative programme in rural development with the World Bank. Without this support the study would not have been possible.

Executive Summary

The paper examines how to better accommodate biological resource concerns in rural development projects where poverty alleviation and welfare improvement are the primary aims and considerations. It notes that habitat change and land-use intensification outside Protected Areas (in their various forms) are to an extent inevitable given population and economic growth, human value systems, and the demands of the market. The challenges it addresses are to ensure that change and development occur without unnecessary loss of bioresources, that sustainable as well as productive systems are established, and that the social groups most dependent on biological resources do not suffer.

The term biodiversity is used in different ways, often to describe the wider values of nature associated with abundance as well as its variability and variety. To avoid confusion, the paper uses the term biological resources in considering the totality of economic goods and services that nature provides and reserves the term biodiversity for use in its strict or scientific sense. It also considers the distribution of use and non-use values and the way these benefit different groups in society, differentiating between those who suffer and those who gain from bioresource loss and habitat change (or indeed conservation). While there are undoubted synergies between development and conservation, there are also trade-offs and conflicts of interest between stakeholders that are important to identify and understand at an early stage in project development.

The paper reviews the historical progression in strategies and approaches to conservation up to the present day. Most development agencies have moved well beyond protectionist approaches to conservation and, at least at a theoretical level, recognise the need for community participation in bioresource management. However, there is limited understanding of the operational means of achieving participation in large rural development projects and programmes or for representing the economic and livelihood interests of key stakeholder groups in these. To help overcome this, the paper develops a broad planning framework that incorporates detailed analysis of the perspectives and economic interests of different stakeholders, and the representation of these interests in project and programme design.

In conclusion the paper reinforces two overlapping themes:

- That every rural development project, including agricultural projects, is location-specific and it is critical to appreciate the importance of local realities, particularly the detailed interactions between local people and biological resources.

- That while every project must be assessed at an overall (macro) level, it is equally critical to consider micro-economic incentives, and particularly the cost-benefit *distributions* of project impact and biological resource change.

The paper suggests that failure to attend to these issues in the preparation and design of interventions can lead to resistance to project activities, poor uptake of messages and technologies, and unforeseen negative impacts on groups of stakeholders (which may undermine the broader goals of poverty alleviation). It is hoped that application of the methodology put forward will contribute to the design of effective interventions and increase the likelihood of project success.

1 Introduction

1.1 Background

The critical role that biological resources play in sustaining human life has in the last two decades received considerable if belated attention. In 1992 a broad framework for the conservation and use of the world's biological resources—the Convention on Biological Diversity (CBD)—was agreed by the United Nations Conference on Environment and Development (the Earth Summit). Despite increasing recognition, however, 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.

The reasons for loss are complex and locally-specific but frequently relate to the processes of habitat conversion and agricultural intensification brought about by demographic and market-driven pressures (Pagiola and Kellenberg, 1997). Pressures are inflated by the 'public good' characteristics of biological resources and difficulties of internalising values in land-use management. The immediate land-managers in the developing world are commonly the many millions of farmers, livestock keepers, forest dwellers and other sets of rural people, both men and women, whose livelihoods are closely dependent upon the availability and productivity of biological and other natural resources. Their situations may not be identical, however, and different stakeholder groups have different interests in the way the resources are exploited and managed. Some have livelihoods closely bound up with conservation and the sustained use of wild resources while others are driven by market opportunities and investment in the conversion of natural systems to productive agriculture.

Biological resources, their management, and people's livelihood systems are thus complex and intricately inter-connected. In this paper we develop the argument that opportunities for intervention designed for the purpose of rural development must start from a knowledge and understanding of what these resources contribute to different sets of people, the economic incentives and institutional factors governing the process, and the costs and benefits of change. We suggest that failure to take account of micro-level economic-environmental interactions and the cost-benefit distributions of project or programme impact can seriously threaten their performance and lead to less than anticipated economic benefits and unnecessary biological resource degradation.

1.2 The challenge

A central challenge facing development agencies is how to better accommodate ecological concerns in rural development projects and programs where the fundamental aims are poverty reduction and economic development, particularly raising the living standards of poor rural people. Associated with this is the notion of sustainability and the assurance that future generations will not suffer from today's 'short-termist' decisions and

actions. Development and conservation have much in common and it is imperative to seek convergence whenever this is possible. However the two are not always mutually supportive and trade-offs between development and conservation sometimes occur, perhaps increasingly with population growth and other pressures for change. Unfortunately these trade-offs are often ignored or downplayed in project and programme preparation and seldom form a considered and costed part of development planning.

The focus of the study is on rural development in landscapes already modified or converted by human activity, where socio-economic development rather than ecosystem conservation is the primary concern of local people and development planners alike. It is worth a reminder that few if any landscapes are untouched by human activity and most—perhaps 80 percent or more of the globe—are largely a product of it. Unlike national parks and other protected areas, modified landscapes are managed primarily for productive purposes such as agriculture in its various forms, livestock rearing or commercial forestry. By global standards, these areas are not generally seen as biologically rich or diverse and biological resource management takes a back seat. The importance of biological resources in these areas should not be minimised, however, and they form an integral part of the livelihood systems and diets of many of the world's poorest people (see Box 1.1).

In this context the study examines the issues to be addressed to minimise environmental damage and retain wherever possible the essential contributions that biological resources make to rural livelihoods and social and economic development. The study covers both agricultural biodiversity—the range of soil, plant and animal organisms, species and ecological functions that contribute to agricultural productivity—and more particularly the wild resources and niche habitats of modified landscapes, together with the natural ecological functions and services such as plant pollination and nutrient cycling that they support.[1] As discussed in section 2.1, the term biological resources is used to encompass not just biodiversity but also the totality and abundance of living organisms (see section 2.1). [2]

1.3 Human-centred perspective

There are two distinct ways of considering the value of biological resources and the case for their conservation that can give rise to major differences in understanding (Pearce, 1994; Grimble, 1996). The *ecocentric paradigm* suggests that all living species have a moral and equal right to exist. In this argument all species are deemed to have an *intrinsic value* irrespective of any value that humans derive from or attribute to them. The *anthropocentric paradigm,* on the other hand, views biological resources as a collection of goods and services that support the maintenance and enhancement of human life. Conservation is necessary where their loss reduces the stock of natural capital and the resource base available for current or potential future use. Their loss may also endanger local and global life-support systems and ultimately threaten the future of humankind.

For both theoretical and practical reasons we take an anthropocentric position in this study:

- The ecocentric concept of intrinsic value is unmeasurable or even unknowable, and seemingly has little utility for practical management. Without some assessment of relative importance there is no rational way for choosing or prioritising between actions[3]

- Rural development is itself anthropocentric, aimed at reducing poverty and improving the welfare of people, particularly the poor. If this is the case, and with the proviso that development should be sustainable, people-

Box 1.1
The value of bioresources to local people

Though many bioresources do not enter markets or provide financial income, they contribute significantly to many people's nutrition and livelihoods. They are particularly important in times of hardship and in marginal areas, especially for the very poor, women and children. The IIED document "The Hidden Harvest" (1992) identifies some examples:

- wild foods from common property are estimated to contribute some 20% of the nutrition of the poor in the dry season in parts of India
- in 1973, the Berti tribe in Sudan survived a famine in large part by collecting wild grass seeds
- unmarried and divorced women in Usambara in Tanzania support themselves by the collection and selling wild leaves and berries
- some 41 percent of the Karimojong population in Uganda subsisted largely off wild foods in a famine in 1980.

The following uncultivated products are of value:

- wild foods such as fruit, berries, nuts, fungi, bush-meat and insects such as grasshoppers
- housing construction and roofing materials, such as poles and grasses
- raw materials (e.g. rattan, raffia, reeds) for manufacture of furniture, tools & ropes
- traditional herbal medicines
- clothing and bedding (e.g. bark cloth and kapok)
- fuel for cooking and heating (e.g. firewood and charcoal)
- animal feed, fodder and litter.

In agriculture, bioresources provide:

- inputs such as manure, compost and mulch.
- crop and livestock varieties, cultivars and landraces (including wild relatives)
- wild and domesticated pollinators and associated products (honey and wax)
- soil organisms that contribute to soil fertility and nutrient recycling
- predators of important pests that damage cultivated crops
- coppiced poles and other products
- livestock feed and forage.

More generally, bioresources provide:

- protection against the adverse effects of climatic variability and extremes
- resilience and maintenance of a healthy agro-ecosystem
- new potential crops and livestock types
- genetic material for breeding improved yields and pest/ disease/ drought resistance
- culturally and spiritually preferred environments for human habitat and leisure.

centred objectives logically take precedence over other considerations.

In taking our people-centred position, we give central consideration to distributional as well as global aspects of biological resources, and particularly the values ascribed to them by different sets of local people. These people, many of whom are directly dependent on biological resources for their livelihoods, are commonly under-represented in society both economically and politically. In both development and conservation planning, it is vital to ensure that the social groups most dependent upon biological resources are not harmed by development or habitat change, or are properly compensated where they are.

1.4 Target audience and paper structure

The paper is targeted at the following sets of people:

- Task managers, desk officers, and others in development agencies such as the World Bank and national government with front line responsibility for planning and

managing rural development projects and programmes

- Staff in development agencies with higher-level responsibilities, able to determine or influence policy direction, strategic thinking, operational procedures, and 'good practice'

- While not the primary target audience, the paper will also benefit specialists and technicians who conduct professional studies and contribute to project and programme design and management.

The paper is divided into four chapters. Chapter 2 outlines the conceptual basis of the study, discussing the values and relevance of biological resources in their various forms to different sets of people. Chapter 3 reviews different approaches to nature and biodiversity conservation over the years and the thinking and strategies guiding practice today. Chapter 4 brings the paper to a practical conclusion by identifying the necessary conditions and barriers for improvement, and developing a broad framework for planning rural development.

2 Conceptual Framework

2.1 Clarifying definitions

Biodiversity is a concept open to multiple interpretations and meanings and as such is vaguely defined and understood. The most widely accepted definition is set out in the Convention on Biological Diversity (CBD, 1992) in terms of the variety and variability of life. This is broken down into its genetic, species and (generally) its ecosystem components with secondary reference to the ecological complexes of which they are part (see Box 2.1). In everyday parlance this may be simplified to refer to rare and threatened habitats and animals of global importance.

The emphasis on variety and variability in scientific interpretations leads to questions concerning its local (as well as global) validity, and at what place and scale *diversity* is necessary and should be assessed. The focus on variability also underplays the practical importance of quantity and abundance. One bee is hardly important by itself; its value to pollination is the fact that there are many millions of them. Moreover, the variability focus leads to an emphasise on physical attributes (particularly genes and species) and underplay the values associated with its less tangible functions such as pollination and nutrient cycling, and on a wider scale, its contribution to watershed protection and ecosystem resilience.

These dilemmas move us from biology into the world of social science and the values and benefits derived by humankind from nature. Some authors have argued the need to separate the value of diversity from the wider attributes of biological resources (Aylward, 1991). Others have stretched the concept of biodiversity in such a way to encompass not only diversity but to include ideas not associated with variability alone. Indeed, increasingly commonly the term is used more or less as a synonym for nature in general, and the terms nature and biodiversity conservation are used interchangeably.

We believe it is important to reduce confusion by distinguishing between *biodiversity*, defined in its scientific sense as the variability and

Box 2.1
The science of biodiversity

As noted above, the scientific definition of biodiversity focuses on the variety and variability of biological life considered in terms of its hierarchical composition at genetic, species and ecosystem levels. All species and differences between them are the result of evolutionary change caused by the effect of natural selection on genetic variability within the ancestral heritage.

Levels in the hierarchy are not discrete, however, and there is overlap and connectivity between them all. In effect, they are ways of looking at the same thing at different scales. Many genes are found within species, many species are found within ecosystems, and many ecosystems are found within the biosphere. Thus ultimately all levels can be defined by their genes.

variety of life, and the *abundance* of living resources and ecological functions found in all landscapes throughout the world. We suggest that biodiversity and bioabundance are two distinct qualities associated with biological resources, each of which are of potential major importance to local people and others. In this study we use the term biological resources, or *bioresources,* to encapsulate diversity and abundance when taken together, and reserve the term biodiversity for use in its narrower sense. In Table 2.2 we distinguish between the two sets of value (diversity and abundance) and give examples of likely beneficiaries of each.

2.2 Disturbance and change

In bioresource terms, the world's landscapes can be viewed along a 'disturbance' continuum, from purely natural states to the artificial creations of man (Table 2.1). At one end lie pristine ecosystems, though apart from the tundra it would be difficult to find completely natural landscapes untouched by local people (e.g. even remote tropical forests are used by pygmies and others for hunting and gathering). Disregarding the built environment, at the other end of the spectrum lie highly-specialised commercial farms and plantations practising industrial agricultural and animal-rearing systems, using artificial chemicals, heavy mechanisation and purchased inputs, creations that in the future can be expected to increasingly incorporate genetically modified organisms (GMOs).

In between lie a vast array of partially converted agricultural landscapes whose position along the disturbance continuum can be assessed in terms of input or output intensity. A movement from subsistence to market based ventures and a rise in resource productivity may parallel this disturbance. Land extensive systems include shifting or slash and burn systems barely discernible from natural forests, traditional mixed crop systems producing a variety of food for domestic consumption or sale, and numerous systems incorporating tree crops and livestock combinations.

There are always changes, and frequently losses, in both biodiversity and bioabundance across the disturbance continuum, as intensification and specialisation continues (Table 2.1). With

Table 2.1. Three land-use models on the disturbance continuum

	Natural state	*Partial conversion*	*Total conversion*
Land system	Pristine natural landscapes and habitats	Multiple types and degrees of conversion and intensification	Predominantly man-made systems and mono-crop production
Bioresources	Generally diverse and abundant	Diversity & abundance dependent upon the intensity and nature of management	Intensification leads to losses in diversity and abundance
Market values	Low, but under-estimated because functions & values unknown/ unpriced	Values dependent upon nature and degree of change	High, but may be overestimated and disregard external costs
Sustainability	All states may managed sustainability but threats and uncertainties to both biodiversity and abundance greatly increase across the continuum →		

the arguable exception of industrial agriculture, however, losses are not absolute and many managed as well as natural landscapes can incorporate a great deal of environmental value. The ecological values of these landscapes is often only recognised with development. In Britain, for example, conservation is seen to require the return to the relatively-extensive farming systems of the recent past—now seen to contain much biodiversity and to provide many valuable ecological services—rather than to the natural state and vegetation of the area.

2.3 Bioresource values

We earlier alluded to the fact that both biodiversity and bioabundance provide a range of goods and services of value to humans and it is these that drive anthropocentric arguments for conservation. A number of analytical frameworks for the economic valuation of the environment have been developed which we have applied to bioresources. These are described in Box 2.2 and developed further in Table 2.2.

While this framework is helpful for conceptualising the *total economic value* of bioresources, there are many theoretical and practical difficulties in its use. These values are generally extremely difficult to measure and apply, including contingency valuation techniques that assess people's willingness-to-pay for conservation. Moreover the values assigned are not 'socially neutral' and may be reckoned differently by different stakeholder groups. International comparison poses a particular dilemma; for example, it would hardly seem ethical for (inevitably) vague estimates of the existence value of the North to dominate the direct-use values of poor local people in marginal parts of developing countries.

We mentioned above that some of the values of bioresources relate to the abundance of the resource while others are derived from diversity itself. The utility of fuelwood collected by rural people is likely to be more dependent on its availability and abundance than its diversity,

Box 2.2
An economic valuation of bioresources

The primary distinction in valuing bioresources is between *use* and *non-use* values. *Use values* refer to the purposeful use of bioresources to gain some economic benefit or utility. Goods can be consumed by the household that hunts, collects or grows them, used as raw materials, or traded and sold. Other use values relate to activities such as trophy hunting, ecotourism, and bird-watching. *Indirect use values* are associated with the ecological functions that maintain the stability and productivity of the environment. Locally, wild pollinators such as bees and insects are vital for crop production as are soil organisms for nutrient cycling and fertility maintenance. On a wider scale values include the protection bioresources afford water catchments and hydrological regimes, and the contribution of forests and vegetation to atmospheric balance and climate regulation. Bioresources can also be valued for the aesthetic, cultural, spiritual or recreational benefits they provide.

Bioresources also provide intangible *non-use* benefits relating to their potential future use or to their very *existence*. Species that currently have no known use, or are themselves unknown, may yet become important foodstuffs or provide valuable medicinal compounds or genetic resources in the future. Similarly, species that are currently unimportant to an ecological complex could in future be critical. Acknowledgement of present uncertainty and the potential for future values suggests that society may be willing to pay for the option of maintaining diversity.

Existence values represent the satisfaction that an individual derives from the knowledge that a given element of biodiversity exists, irrespective of whether that individual ever expects to use or benefit from it directly. Such value may be associated with ethical, moral, or cultural beliefs, reflecting, for example, the concern that many feel for endangered species such as whales or tigers, or threatened ecosystems such as rainforests.

though people will also be aware of critical differences in the burning and heating qualities of different species. In other situations it is the diversity which is of direct value: for example, a farmer may plant a range of different crops and varieties so as to minimise damage from pest attack or weather extremes, or to take advantage of local micro-climate and soil-types. The way farmers deliberately select and grow a large number of local varieties of beans in the Tanzanian central highlands is discussed in Lamboll and Van Broekhoven (1999). Generally, then, biodiversity is used to reduce risk and improve sustainabilty and productivity, and forms an essential part of many poor people's livelihood systems.

2.4 The distribution of values

At the heart of the debate about the conservation of bioresources and its relevance to rural development lies the vexed question of cost/benefit distributions. Most but not all local values are *direct use values,* which provide immediate and practical benefits to local people. At a regional level direct use values are less in evidence and the contributions made by *indirect functions and services* become more important. At the international and global scale, the importance of *non-use existence* value becomes paramount, though retaining *options* for potential future use can also be critical (Table 2.2).

It is now accepted that structural and institutional matters such as property rights, local culture and resource access are likely to govern the distribution of values in any particular situation (Hanna and Munasinghe, 1995). For example, indigenous people with long-standing access rights to a forest may

Table 2.2. The economic values, benefits, and beneficiaries of bioresources

Use values			*Non-use values*	
Direct use values				
Consumptive	*Nonconsumptive*	*Indirect use values*	*Option values*	*Existence values*
Definition: 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
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 diverse species and ecosystems
Example values from abundance: food, fuel, fodder, raw materials	Birdwatching and recreation	Carbon storage, nutrient cycling, photosynthesis, waste assimilation	None identified	Cultural and spiritual assets
Example beneficiaries: poor rural people including 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

Source: Developed from Barbier, 1992; Pearce and Moran, 1994; Blaikie and Jeanrenaud, 1996; and Hodge, 1997.

utilise a variety of non-timber forest products, both animal and vegetable. Similarly, forest-margin groups may supplement their livelihoods with wild products and retain sacred areas (forest groves) for spiritual purposes (see Box 2.3). Collecting and gathering wild products from common land is frequently the task of women and it is they who are often most affected by their loss. In contrast, farmers with secure cultivation rights are likely to benefit more from the agricultural service attributes of bioresources such as the mulching and composting properties of microbes and soil organisms.

As the values of bioresources are unevenly distributed in society, it follows that the costs and benefits of loss or conservation are also unevenly spread. It is now well-established that attempts to conserve a habitat by evicting, restricting access, or preventing certain usage has an opportunity cost borne by those directly dependent on the area. Similarly, developmental activities such as road construction or groundwater development schemes impact in various ways on the economic interests of different rural populations. As stakeholders themselves, development agencies and conservation bodies make policy choices that implicitly make trade-offs between different objectives. Despite increasing use of project designations designed to encompass the twin objectives of conservation and development (such as 'sustainable development' or 'community-based conservation', not all activities are beneficial to all and difficult judgements have to be made between short and long-term objectives.

With the rise in global populations and the scarcity value of natural resources, there is an increasing demand for the goods and services that bioresources provide and especial concern for unnecessary loss. A key policy objective is, therefore, to identify ways to minimise trade-offs between environmental, economic and equity objectives, and where at all possible develop win-win-win situations. We return to this question later but at this point can indicate two needs. Firstly, to give priority to protecting those elements of biodiversity that provide most benefits to local rural populations, especially the poor; and secondly, to ensure that the benefits obtained from conserving bioresources outweigh the full operational and opportunity costs of conservation. It is important that this is done not just as a project-level calculation but also from the viewpoints of the stakeholder groups most directly concerned.

Box 2.3
Different local perceptions of the use value of bioresources

While wild foods may be an important part of the diets and livelihoods of some rural people, others may consider them weeds or pests of agricultural crops. For example:

- Caterpillars are widely eaten and marketed but are a major pest of many crops such as cotton
- Green leafy plants are extracted as weeds from agricultural fields but provide valuable additions to the diets of many people and domestic animals
- Termites can be an important food supplement in many parts of southern Africa but reduce yields and handicap cultivation in other situations.

In circumstances such as these, different stakeholders may view the same bioresource quite differently, a cost to one being a benefit to another. The complexity of dealing with such issues is illustrated on a wider scale by different sets of interest towards the conservation or conversion of forest land. In the Himalayan foothills, for example, livestock keepers practising seasonal transhumance may clash at certain times of the year with those groups and government departments with an economic interest in maintaining forest plantations.

Source: IIED 1992.

3 Strategies and Approaches to Conservation

The word 'biodiversity' is a relatively recent one that has become widely used only since the mid-1980s; prior to this most of the approaches to bioresource conservation referred to nature or wildlife conservation. Though many of the issues and challenges remain the same, the considerations have moved well-beyond the scope of earlier approaches. This chapter briefly reviews historical developments that have led to the current situation and considers the issues that guide conservation practice today.

3.1 Historical trends

References to environmental degradation go back to Egyptian and Grecian times, notably Plato's description of an over-grazed landscape in Attica as being "like the skeleton of a sick man, all the fat and soft earth having been wasted away, and only the bare framework of the land being left" (Rhodes and Odell, 1992). Early attempts by authorities to protect the environment were generally undertaken for utilitarian or recreational reasons, particularly for use by the powerful. In Lower Egypt, for example, the Pharoes retained areas for hawking and hunting and in England William the Conqueror extended *forest law* to large tracts of land (including the present day New Forest) "to protect and provide for sport and the provision of game" for his retinue.

The rise of modern conservation consciousness in Britain gathered momentum in the late 19th century with urbanisation and the disappearance of wildlands. State involvement in the regulation of natural areas for the public good began in the 1860s when legislation was passed to widen public access to common lands (e.g. the London parks such as Clapham Common). Running parallel to this was a growing romantic interest in nature and also a scientific concern. In 1869 the philosopher and economist J S Mill advanced arguments for the preservation of species for their own sake, independent of their economic utility (Western and Wright, 1994). Out of this developed the notion of a nature reserve managed for its wild and diverse species.

On a much grander scale conservation movements developed in the United States, led by John Muir founder of the Sierra Club, and other spiritualists and romantics. The dominant theme was the attempt to reserve nature for its intrinsic value and in separation from humans. The fact that most environments are shaped by human activities was not recognized and the economic interests of local communities were entirely discounted. Thus Yellowstone, the first in a series of national parks, was established in 1872 to preserve the pristine wilderness, evicting the native Shoshone, Crow and Blackfoot Indians in the process. Only later were developing tensions, such as those between preservationists and forest logging interests, publicly acknowledged. In the Roosevelt era, stand-offs arose over plans to flood a valley in the Yosemite National Park for the provision of water to San Francisco, followed in the post World War II period by a series of water conflicts. The split later widened when the animal rights and deep ecology movements

surfaced and began to champion the interests of species and nature on ethical and moral grounds (Western and Wright, 1994).

3.2 Fortress conservation

In developing countries, early conservationists were similarly motivated by the desire to protect wildlife and nature in their pristine and undisturbed condition. The main focus was the establishment and management of protected areas (PAs) in the form of forest reserves, nature reserves and national parks. Early initiatives included the establishment of forest reserves in the West Indies and a botanical garden in South Africa (1820). The momentum to preserve forest and game in various parts of the colonial empires built up towards the turn of the century, and there was renewed activity after World War II (e.g. in East Africa). During this period the colonial focus on hunting and game management merged with a growing international interest in wildlife conservation, and many controlled hunting areas and game reserves were reclassified as national parks (Adams and Hulme, 1997).

The process of identification, establishment and management of all such areas was top-down and politically-led, with selection taking place centrally and implementation by government ministries. Emphasis was given to protecting areas of high species-diversity or those where high-profile animals or natural habitats were threatened. Selection criteria were based on the need to protect features of global (or Northern?) importance and local interests were barely recognized or taken into account. The management aim was to minimize human disturbance within PA boundaries so that natural, ecological processes would maintain the environment and continue to provide habitat suitable for wildlife. As in the early years of conservation experience in the USA, this followed a protectionist or 'fortress conservation' approach in which local people living within the park were evicted and excluded from use of the natural resources on which they had previously been dependent.

The outcome of this was often ongoing confrontation between the PA authorities and local people. In East Africa the Maasai and other pastoralists continued to graze their livestock, hunt game (or poach, depending on perspective) and cultivate land within newly established park boundaries. In an effort to prevent such practices, the authorities were forced to commit greater resources to maintaining and patrolling boundaries and enforcing regulations. Problems became more serious over time, brought about by increasing population pressure on PAs and surrounding areas, and the escalating cost of protection. The fencing of areas sometimes also had a deleterious effect on the wildlife for which the PAs had been established, particularly where fences crossed migratory routes.

The problems of fortress conservation with its top down and centralised approach to PA management generally failed to protect the wildlife as fully as intended and often caused hardship to local communities. The attempt to separate conservation from development concerns was increasingly challenged and the approach was ultimately overtaken by another discourse often termed community-based conservation (Western and Wright, 1994; Adams and Hulme, 1997).

3.3 Community-based initiatives

In contrast to fortress conservation, community-based conservation (CBC) is based on an improved understanding of the linkages and mutual dependence between conservation and local people, and the need for people to participate in conservation activities. It is the decisions and actions of local people that commonly bring about bioresource loss and the approach sees working with them, and getting

them on management's side, as being of key importance to conservation. Development of the CBC narrative runs alongside improved understanding of the economic rationality of poor rural people and growing recognition of the depth and value of indigenous knowledge.

This linking of conservation and development interests was developed and reiterated in many documents important to biodiversity conservation, most notably the Biodiversity Convention, signed by some 170 nations at the United Nations Conference on Environment and Development in 1992. Numerous attempts have been made to operationalise the approach including UNESCO's Man and Biosphere program (which promoted buffer zones around PAs in an attempt to meet the needs of both local communities and the PAs themselves), and integrated conservation and development projects. Understanding the interdependence of nature and local people has since been taken further: for example, the theme of the African Regional Biodiversity Forum held in Mombassa in February 2000 was "Using Biodiversity to Strengthen Livelihoods". The aim of the forum was to "explore ways to integrate poverty alleviation considerations into local, national and regional actions aimed at conserving, using sustainably, and sharing equitably, the benefits of biodiversity."

The positive legacy of community-based-conservation is thus now widely recognised, including the need to involve local people in the planning and implementation of projects. The jury is out, however, as to whether the structural shift has been as successful in reality as in rhetoric. The overarching aim remains one of bioresource conservation with the unwritten assumption that, when done in the right way, conservation is of automatic benefit to local people. While most if not all conservation practitioners now advocate the involvement of local communities in their programs, there is only limited evidence of local people's views being assessed and incorporated in the planning, management and implementation of projects (IIED, 1994; Brandon, 1993; Little, 1994). Moreover there is little recognition of the complexities of participation and methodological difficulties are often swept under the carpet (Arnstein, 1969). Many programs still fail to fully analyse problems from stakeholder perspectives or properly consider who bears the cost of conservation (see the example in Box 3.1). This is especially critical when what is to be conserved is of national or global value but of limited relevance to poor local people.

3.4 Conservation outside protected areas

Though conservation practice has moved on a long way from the legacy of fortress conservation, conservation funding is still dominated by the establishment and management of Protected Areas (PAs) chosen for their contribution to global biodiversity and containing high species diversity or rare or endemic habitats under threat (World Bank, 2000). Even where project activities are classified as relating to conservation outside PAs, this often means the management of buffer zones rather than areas with no connection to PAs at all. Such a continued focus on PAs reflects the continued nature or wildlife conservation mindset and the emphasis this places on the protection of natural habitats and rare and threatened species (see Box 3.2).

As more and more natural ecosystems are converted or heavily modified, exclusive reliance on a PA network becomes less viable. Examination of environmental policy and practice in developed countries demonstrates that managed areas, as well as natural landscapes, contain much of environmental value and should be considered as important for conservation (see the UK case study, Box

Box 3.1
Uneven participation and success in CAMPFIRE

The structure of the well-known CAMPFIRE initiative in Zimbabwe provides for decentralisation of decision-making and the devolution of resource management responsibilities, passing incentives for conservation management down to local communities. The devolution of power has had considerable success in changing attitudes from dependency on central institutions to self-reliance and self-sufficiency. In the process, local institutions have also been strengthened in terms of project management and accountability.

However, whilst community participation has been effectively implemented in some areas, in others this has been much less successful. The problem has usually concerned the nature and effectiveness of the devolution process. In some cases devolution has gone no further than the district councils, leaving local communities frustrated and powerless, let alone the individual households where resource management decisions are commonly made. This has led to misunderstanding and sometimes hostility towards CAMPFIRE, increasing mistrust of district councils, lack of effective environmental controls, and intolerance of wildlife that cause damage and provide no local benefit. Environmentally the result has been negative, with continued illegal poaching and further encroachment into wildlife areas. The problems of participatory conservation management have been more acute in marginal areas with fewer elephants or other wildlife valued by tourists and hunters, and thereby attracting less finance.

Source: Janowsky and Zanré, 1999.

3.6). Many highly modified and fragmented landscapes in developed and developing nations alike provide habitats for a large variety of adaptable and new species and for the numerous ecological functions that sustain agriculture (Srivastava et al, 1996). Exclusive concentration on global concerns for their rarity or diversity is no longer appropriate and it is necessary to widen our appreciation and consider the value of bioresources in all areas and to all people.

Many of the world's poor live in such agricultural landscapes greatly changed from their natural state and where natural resources are exploited for productive purposes.[4] The aim of donor interventions in these areas is poverty reduction and welfare enhancement and, though sustainability concerns are also considered important, bioresource conservation as such usually takes a back seat. This is despite the recognition of the role wild

Box 3.2
A successful example of community-based conservation

The *sal* forests of West Bengal in India had traditionally provided an important resource for local people. However the assumption of state ownership and control undermined traditional property management regimes, and the forest became badly degraded with no standing trees outside village environs, and in some areas even tree roots were extracted for fuelwood. Local people were aware of the negative changes arising from forest degradation, and reported impacts such as temperature increase, lower rainfall, drier earth, difficulty in finding wood for tools and fuel, and drying up of water sources.

The subsequent establishment of Forest Protection Committees returned a degree of local control over forest use to the villagers and re-established incentives for local people to protect forest areas. This has reportedly resulted in forest regeneration with local people citing benefits such as reduced insect attack on rice crops (due to increased bird populations), improved water infiltration and less runoff, and cleaner air. Villagers say the forest is important in cleansing the air of disease and generally contributing to a healthy environment.

Source: Janowsky and Zanré, volume 2.

Box 3.3
Current policies and procedures towards biodiversity in the World Bank

World Bank recognition of the importance and contributions of biodiversity for many years has focused on PAs and the global values of rare and threatened species and habitats. In screening projects for Environmental Assessment purposes, current Bank guidance highlights the need to identify "*the potential for significant conversion or degradation of critical or other natural habitats*" (OP/BP 4.04). Natural habitats are described as those where "*(i) the ecosystem's biological communities are formed largely by native plant and animal species and (ii) human activity has not essentially modified the area's primary ecological functions.*" Critical natural habitats are those selected on the basis of "*species richness; degree of endemism ,rarity, and vulnerability of component species; representativeness; and the integrity of ecosystem processes.*"

The emphasis on natural and critical habitats is acknowledged in the Bank's second Environment Assessment (EA) review (World Bank, 1996) which states that: "*many EAs appear to be biased towards non-degraded forest habitats as the principal concern, even though other habitats can be important for biodiversity and its conservation. Few of the EAs exploited opportunities within the project to conserve or increase biodiversity even where this would be beneficial for people in the project area.*" It is important to note, however, that there is an ongoing shift in the Bank to correct these distortions, including the consideration of biodiversity issues in modified habitats and improving the integration of conservation with mainstream developmental activities.

bioresources play in the livelihoods of rural communities, and especially of the poor.[5]

In the case of the World Bank, an examination of biodiversity in the agricultural sector portfolio (Jana and Cooke, 1996) shows that only 40 out of 402 (less than 10%) projects explicitly involved the conservation and management of biodiversity, and even in these biodiversity is generally treated as a separate issue rather than integrated with other project activities. The paper also indicates that environmental assessment of agriculture-sector projects rarely directly discuss biodiversity issues, and where they do, it is usually in the context of the likely effect of project activities on PAs, or the establishment of conservation areas as mitigation for certain negative environmental impacts of the project. Rarely is there any discussion of the importance of biodiversity within the agricultural lands themselves.

Despite this apparently bleak position, the paper does provide some evidence of positive trends towards more environmentally sustainable agricultural activities. The analysis is based on a broad characterisation of the impacts of activities undertaken; for example, agroforestry and IPM activities are rated as having positive effects on biodiversity, whilst pesticide use and plantation cropping of cash crops are rated as negative activities. The danger of such simplification is recognised by authors: while IPM may generally have a favourable or neutral effect on biodiversity, in some instances it may impact negatively on local livelihoods (See box 3.4 and Russell-Smith, volume 2).

3.5 The current paradigm

During the 1980s the notion of *sustainable development* developed, centred on the 'wise use' of natural resources.[6] The work culminated in the Rio Declaration (1992), a set of 27 principles for sustainable development, and Agenda 21, a global action plan for their implementation. A number of different approaches to integrating environmental and developmental goals have since been developed which fall within the framework of sustainable development. At the country level, *comprehensive development frameworks*, *national strategies for sustainable development*, and *poverty reduction strategy papers* are designed to provide strategic guidance.

Box 3.4
The effect of integrated pest management on biodiversity

In recent decades a variety of agro-ecological approaches including agro-forestry and integrated pest management (IPM) have been developed to minimise the environmental impacts of agricultural activities and protect biodiversity. IPM was developed in response to the enormous damage inflicted on the environment by the widespread and intensive use of chemicals in the control of harmful insects and pests. The fact that it aims to reduce or eliminate negative environmental impacts has led to the assumption that IPM techniques and programs are necessarily environmentally benign. Though it is undeniable that IPM is preferable to the heavy and prescriptive use of chemical inputs (pesticides, herbicides and fungicides), there has been little or no research to assess its actual impacts on biodiversity (Russell-Smith, volume 2). But it is perfectly clear that IPM programs will adversely affect specific taxonomic groups, if only the pests they are designed to control.

If IPM affects some taxonomic pest groups it is quite possible that some of the technologies used in an IPM program will also affect - directly or indirectly - other forms of life, including those deemed to be non-harmful or even useful. While these impacts may appear negligible or unimportant, a huge variety of pests (such as termites and caterpillars) and weeds are utilised by local communities, especially in hardship periods. Impacts on biological systems may or not be significant but we cannot assume without study that IPM technologies have no negative impacts or are necessarily technically and economically appropriate for all groups of local people or in every situation.

Condensed within these are approaches that aim to balance economic, social, and environmental objectives in an integrated way. The *sustainable livelihoods approach* (SLA) is a way of thinking about poverty elimination and the needs of the poor that rests on core principles stressing people-centred, responsive and multi-level approaches to development. Like other sustainable development concepts, the SLA has multiple interpretations but is essentially a holistic and systems-based approach to development that incorporates the key ideas of participation, wise-use of natural resources, and economic stability. The SLA thus aims to meet the developmental needs and aspirations of the poor in a socially and environmentally sensitive way (Scoones, 1998; Ashley and Carney, 1999).

Whereas the SLA is first and foremost people-centred, the *ecosystem approach* (EA) works from the opposite side of the coin, addressing conservation issues and ecosystem integrity in a way that is sensitive to local communities. The central idea is the need to manage ecosystems as entities, but recognising that they cut across jurisdictional and other boundaries. While essentially aimed at maintaining ecosystem integrity and productivity over the long term, the approach emphasises the importance of local people and acknowledges a place for "appropriate human modification" of these systems (World Resources Institute, 2000).

Neither the SLA nor the Ecosystem Approach are strictly new but rather syntheses of lessons learnt from earlier approaches. In effect they represent a convergence of development and conservation ideals, with both adopting the same integrative and systems-based stance but looking at issues from opposite sides of the coin. The current challenge is to find ways to operationalise these approaches that take full account of practical realities. While it is relatively easy to deal with situations where multiple goals converge, in most situations there are trade-offs between short and long-term objectives and conflicts of interest between multiple stakeholders (Grimble and Wellard, 1997). For example, decisions regarding matters such as the clearance or protection of forested land often have to be made where development or conservation

Box 3.5
Lake Tanganyika: an example of complex stakeholder interests and conflicts

Lake Tanganyika is a globally important biodiversity site with 300 endemic fish species and over 1,200 in total, the second highest species count of any lake. The lake's global importance prompted the establishment of a major UNDP/GEF funded biodiversity conservation project aimed at identifying major threats and preventing biodiversity loss. The project reflects the high non-use (existence and option) value placed on it by the international community. However the lake's fisheries are also an important local bioresource with high use values to local people. These differing values have led to a number of conflicts between stakeholders. Local people have little or no appreciation of global biodiversity concerns and why outsiders deem conservation so important, nor apparently do outsiders appreciate the livelihood concerns of local people.

When one area was designated as a National Park, changes in fishing regulations gave rise to conflict over fishing rights between the National Park Authorities and neighbouring villages. Traditionally, fishermen had followed the movement of fish into the newly designated exclusion zone but with the changed status this was no longer permitted. The problem was magnified by the absence of markers or buoys indicating the boundary leading to unintentional entering of the park and the confiscation and destruction of equipment. While the new status has led to widespread and unforeseen problems, the fishermen from one village have apparently benefited from the exclusion, as the sanctuary acts as a reservoir for the particular type of fish they catch.

To offset the loss of fishing rights, compensation payments have been made in the form of building materials for classrooms and teacher's offices. While the provision of improved educational facilities is welcome and potentially beneficial to the communities, the impact is seen as indirect and long term. The villagers do not consider such help as sufficient compensation for the loss of fishing rights, which has severely affected their livelihood-sustaining activities. Nor does it provide any incentive for fishermen to reduce their fishing intensity. To maintain their livelihoods, the fishermen must either continue to fish (illegally) in the exclusion zone or increase their catch from other parts of the lake.

Source: Lamboll and Van Broekhoven, in press.

initiatives are contemplated. Addressing these matters is no small challenge given the major gaps in our understanding of people-ecosystem interactions, the methodological difficulties of assigning economic values to unmarketed goods and services, and locally-variable political, social, and institutional barriers to truly participatory approaches.

Box 3.6
Lessons for development from conservation experience in the U.K.

For many generations the vast majority of land in Britain was managed for agriculture, forestry or other productive purpose, and today virtually no areas remain that could be described as truly natural. Until recent decades these agricultural environments were both bioresource rich and attractive places much valued by the general public. With incentives provided by the European Common Agricultural Policy (CAP), changes became more radical since the 1960's and traditional extensive agricultural systems were replaced by highly-productive systems and technologies characterised by heavy mechanisation and chemical usage. Until recently all state assistance was designed to raise input productivity and no mechanism existed whereby farmers could profit by reducing production or promoting the existence of biodiversity on his or her land.

Two major agro-environmental schemes have been introduced in the last decade to reverse this process. The Environmentally Sensitive Areas (ESA) and Countryside Stewardship (CS) schemes provide mechanisms by which farmers receive payments for managing their land in environmentally-positive ways, including the

(*continued*)

Box 3.6 (*continued*)

Lessons for development from conservation experience in the U.K.

enhancement of biodiversity. Neither scheme sets out to restore virgin habitats untouched by man, or to reduce people's dependence on a particularly valuable piece of land. Rather the aim is to return to a more extensive and perhaps idealised form of agriculture where externalities are minimal and man and nature live in harmony.

In both schemes carefully-calculated payments are made to land managers to provide an incentive to join and compensation for income foregone. These are enacted through management agreements or contracts made by the Ministry of Agriculture with individual farmers. Studies have indicated that the British public values the protection of the rural countryside for its aesthetic beauty, the opportunities for recreation it offers, and for the flora and fauna it attracts. Under the ESA and CS schemes farmers are paid for the provision of these goods and services by the government which acts as a surrogate consumer for the general public.

However the establishment of these schemes has been prompted by fears of over production as much as biodiversity loss. In developing countries priorities differ and food production and economic development are at the top of the list. In no way would most developing countries give the same priority to conservation concerns, or without outside funding have the capacity or afford the cost of running equivalent schemes. The value of the UK comparison is not that similar schemes should be promoted at this stage of development but rather as evidence that poor people cannot be expected to pay for conservation out of their own pocket when livelihood considerations and price signals reflect other priorities. If we wish to give encouragement to poor people to conserve their biodiversity and abundance then economic incentives and institutional structures must reflect these priorities.

Source: Grimble and Laidlaw, in press.

4 Improving Project Design

In this final chapter we start by summarising some of the main conclusions and arguments presented in the earlier chapters before discussing the means of achieving the goal of integrating bioresource conservation into the policies, plans and processes for rural development. We identify barriers to integration and discuss how these affect the treatment of bioresources at the project level. Finally, we propose a broad framework for action and point to the need for more thorough assessment of the impacts of rural development projects on the interacting processes of environmental change and stakeholder livelihoods.

4.1 Summary of the argument

The study sets out to examine how to better accommodate biological and ecological concerns in rural development where poverty alleviation and welfare improvement are the primary aims and considerations. It suggests that habitat change and land-use intensification outside PAs are to an extent inevitable given population and economic growth, human value systems, and the demands of the market. The challenge is to ensure that change and development occur with minimum loss of bioresources, that sustainable as well as productive systems are established, and that the social groups most dependent on biological resources do not suffer.

The term biodiversity is used in different ways, often to describe the wider values of nature as well as its variability and variety. To avoid confusion, we use the term in its strict or scientific sense, and apply the word bioresources to describe the values of diversity and abundance when taken together. The study considers the way bioresources are valued, distinguishing between those derived from diversity and those from abundance. It also considers the distribution of these values and the way they benefit different groups in society, differentiating between those who suffer or gain from bioresource loss and environmental change. While there are undoubted synergies between development and conservation, there are also trade-offs and conflicts that are important to identify and understand at an early stage in project development.

Most development agencies have moved well beyond protectionist approaches to conservation and, at least at a theoretical level, recognise the need for community involvement and participation in bioresource management. However, there is less appreciation of the operational means of achieving this ideal in large rural development projects or the methodological difficulties of people-participation in project design and management. Many initiatives fail to analyse problems from stakeholder perspectives or properly consider who bears the cost of environmental change or conservation. The unwritten assumption remains that conservation and development are mutually supporting and, when done in the right way, benefit all stakeholders alike. We believe this is an oversimplification that lies at the root of many problems, and of special concern when there are differences in perception between local and global interests.

4.2 Barriers to progress

Although much progress has been made in the treatment of bioresources in the context of rural development, it is useful to ask ourselves why the problems outlined above still exist and to consider a number of institutional barriers and challenges:

- There is a continuing *emphasis on global values of biodiversity* associated with rare, threatened and endemic species and habitats and the establishment of protected areas (of various types) to conserve them. A broadening of the way policies and procedures currently address biodiversity and wider bioresources concerns in productive and degraded landscapes would facilitate the incorporation of local bioresource values into project and programme development.

- The demand for an in-depth understanding of local interactions has a *high information requirement*. The collection and analysis of information represents a potential increase in project preparation costs. This can at least partially be addressed by using a process approach designed to facilitate the incorporation of newly-acquired knowledge and understanding into the work of the project.

- The *influence of environmental assessments (EA) on project design* remains problematic. A more thorough integration of EA into project cycle activities, and a widening of the assessment process to include micro-economic/ environmental interactions, would improve project design.

- The *identification of negative impact*s of projects and the mitigatory measures necessary to offset them is important but should not take precedence over the need to seek positive management options for the use of biological resources to sustain local livelihoods.

- The problem of *in-country institutional capacity* can be a significant barrier to effective implementation of an information-intensive approach. Institutional deficiencies may include limited expertise in micro-economic analysis with a systems perspective and the inability of government or local NGOs to adequately represent stakeholder interests.

- The *large scale of most donor-assisted projects* means that taking account of locally-specific variation and cost-benefit distributions is difficult and costly. This problem can in part be addressed through the adoption of a process approach that allows for non-structured and flexible management, and a decentralisation of decision-making where possible to grassroots level.

4.3 A framework for action

In this paper we have considered the importance of understanding people's interactions with bioresources in project planning and management and the need for representing the interests and perspectives of local people in the process. The challenge now is to develop operational systems for taking ideas forward and incorporating these ideas into mainstream developmental activities. To this end we have developed a broad framework for planning (Fig 4.1) to assist the process of preparing specific local actions from broadly-stated strategic goals. An essential element of this framework is the adoption of a stakeholder approach that incorporates detailed analysis of the perspectives and economic interests of different stakeholders, and the representation of these interests in project and programme design (Grimble and Wellard, 1997).

Step 1. Analysing the system

The starting point in the process is the development of an understanding of the local environment and people's interaction with it. This includes:

- The identification of stakeholder groups with different sets of interest in project activities and environmental change
- The economic value and role of goods and services provided by bioresources, including both their diversity and abundance
- The importance of these to different stakeholder groups in livelihood and functional terms
- An appreciation of what is happening to the system in the absence of intervention, including the impact of shocks and stresses
- The impacts of project activities on environment-people interactions, including who bears the cost or gets the benefit from change
- The trade-offs between short and long term management ideals and practices
- The potential conflicts of interest between stakeholders at different scales and levels.

A partial illustration of the web of issues, questions and interactions concerned is given in Fig 4.2.

Figure 4.1 Process for identifying and understanding bioresource problems from local perspectives and preparing rural development projects with bioresource linkages

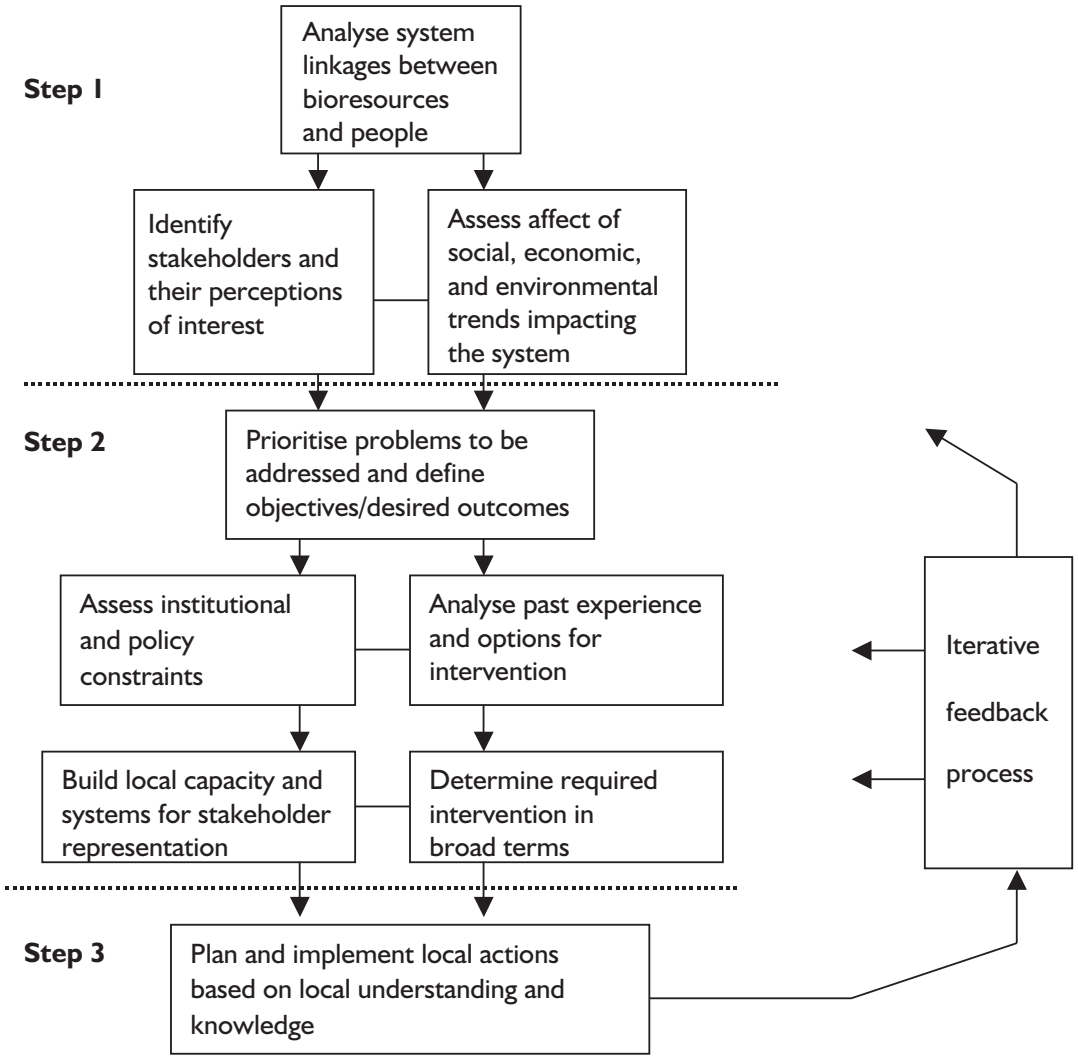
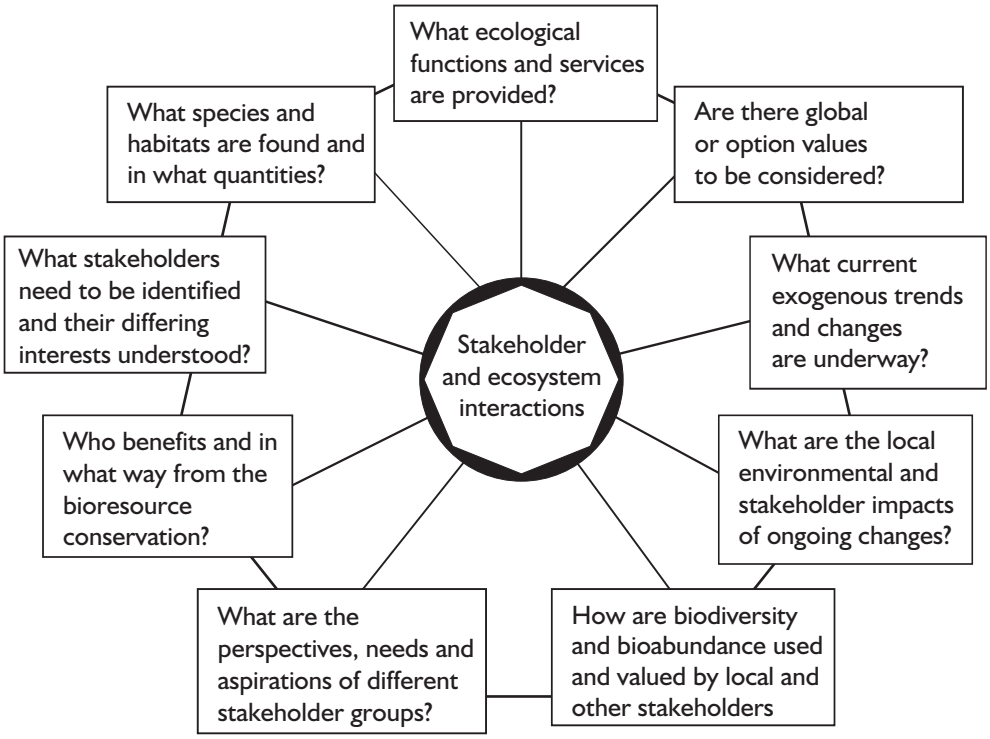


Figure 4.2 The people-ecosystem web: A simplified illustration of issues, questions, and interactions



Step 2. Developing a vision and rationale for action

In light of the above, the second stage in the process is to consider the options for intervention, draw on lessons from past experience, and consider the institutional and policy context impacting on the system and influencing the room for manoeuvre.

The information from various sources is then drawn together to determine the scope and form of intervention. An important element in the process is the effective representation of stakeholder interests in decision-making, particularly those groups with little influence or power. This follows from properly conducted stakeholder analysis but is also likely to require mechanisms for direct participation (e.g. local committees and forums, consensus building, and conflict resolution).

Step 3. Implementation and feedback

The third stage of the process is the action stage in which field level activities are planned and implemented. This stage needs to be highly iterative and flexible, ensuring that interventions are able to incorporate new information and understanding as they became available, and also to respond to newly identified problems and challenges. The design of an effective feedback loop for informing and modifying the management process is therefore especially critical.

A caveat

There is a danger that the above framework might be understood and used mechanistically whereas in fact there is fluidity between the steps and processes. The distinction between adjacent boxes in Fig 4.1 is artificial in that the steps overlap, interact and influence each other. The framework is therefore not a

Box 4.1
An example of good practice:
Reconciling biodiversity and developmental interests in Ghana's wetlands

Ghana's 550 km coastline includes over 50 lagoons, river deltas and estuaries which range in size from a few dozen hectares to over 300 km2. Five of these sites have been recognised under the Ramsar Convention as wetlands of international importance because of their function as over-wintering points for a large number of migratory birds. The sites are Muni-Pomadze, a small wetland just west of Winneba; Densu Delta, a wetland close to Accra with a major salt panning concession; Sakumo, a small wetland bordering Tema under the authority of the Tema Development Corporation; Songor, a lagoon complex forming the western part of the Volta delta; and Keta, a large wetland forming the eastern side of the delta. The sites encompass shallow lagoons of fresh and saline water and their immediate catchments. Besides functioning as bird habitats, the sites are used by local people for a range of livelihood-sustaining activities such as fishing, agriculture, mangrove exploitation, pottery and brick manufacture, and salt production. Economic activities have been conducted at an increasing degree of intensity and commercialisation which in some cases present a significant threat to these fragile ecosystems.

Under the Ramsar Convention the principal management objective of the five sites is *wise use* of resources intended to "safeguard their ecological integrity as wildlife habitats". Investigations carried out under World Bank/GEF Coastal Management Project, part of the Ghana Environmental Resources Management (GERM) Project, showed that local people value the wetlands not so much for their bird life or scenery but for the livelihood-supporting resources and services they provide. The potential trade-off between wetland conservation and micro-economic interests was recognised and a Study of Development Options was commissioned by Ghana's Environmental Protection Agency, funded by IDA. The aim of the study was to identify ways that the five Ramsar wetlands in their present largely-undisturbed form could contribute to the livelihoods and economic well-being of local communities.

A team from NRI was commissioned to conduct a detailed study of wetland-people interactions and identify a range of prospective development options compatible with the environmental objectives. The overriding principle they followed was the need to identify initiatives that benefited local stakeholders in a practical way, with particular emphasis given to the provision of economic incentives and mechanisms for local people to benefit from resource conservation. Enterprises identified included the development of improved small-scale aquaculture, agriculture, livestock, agro-forestry, salt harvesting, low-impact tourism and the establishment of a field centre for environmental education and management. To support these enterprises, vocational training was to be provided in technical subjects and business management, including business plan development, wherever possible making use of existing facilities. Particular emphasis was given to the identification of initiatives that would provide economic incentives for local people to conserve and sustainably-manage the wetlands.

Source: Grimble, Ellenbroek and Willoughby, 1998.

prescriptive tool but should be considered as a system for guiding the process of developing locally-specific and environmentally-sensitive interventions.

4.4 Concluding thoughts

In conclusion we would like to reinforce two overlapping themes of this paper:

- That every rural development project, including agricultural projects, is location-specific and it is critical to appreciate the importance of local realities, particularly the detailed interactions between local people and bioresources.
- That while every project must be assessed at an overall (macro) level, it is equally important to consider micro-economic incentives and particularly the cost-benefit distributions of project impact and bioresource change.

We suggest that failure to attend to these issues in the preparation and design of projects will continue to lead to resistance to project activities, or poor uptake of messages and technologies, that result in less than optimal project performance. It can also give rise to unforeseen negative impacts on groups of stakeholders, including the poorest and most marginal, that may undermine the broader goal of poverty alleviation. The aim of the paper is to develop a broad methodology for countering these problems. We hope that its application will help build effective projects and programmes and increase the likelihood of them achieving what they set out to do.

Notes

1. Wild resources may be found both on and off farm and include uncultivable rocky and marginal areas, forests and woodlands, field headlands and boundaries, and water-courses and wetlands. While often associated with common land, they are also found on land that is held privately.
2. It would be wrong to assume that only natural landscapes are of value for conservation and, indeed, some of the most valuable landscapes are largely man-made. The Norfolk Broads in Britain, for example, is a wetland area of special conservation attention today that only exists because of peat mining activities in medieval times.
3. For example, consider the question of whether or not to destroy the remaining samples of a smallpox virus that no longer exists in the wild.
4. Most of the world's surface (73 percent other than rock, ice, or barren land) has been significantly modified by man's activity (Hannah and others, 1994). Though in developing countries large unbroken wildlands remain, fragmentation and disturbance have already given rise to species extinction and ecological damage over wide areas.
5. We should also bear in mind that, from the perspective of local people, the contribution of nature is not entirely positive. Local farmers may see their management task as a struggle to 'control' nature, or at least to utilise it to best advantage. Over time this struggle normally leads to human domination.
6. The ideas were set out in three key publications—the World Conservation Strategy (IUCN, 1980), the Brundtland Report (WCED, 1987) and Caring for the Earth (IUCN, 1991)—and developed at the United Nations Conference on Environment and Development in 1992 (the Rio Earth Summit).

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