Part I

Integrating natural resource management
The challenge: alleviating poverty and conserving the environment

One of the anomalies of modern ecology is that it is the creation of two groups, each of which seems barely aware of the existence of the other. The one studies the human community almost as if it were a separate entity, and calls its findings sociology, economics and history. The other studies the plant and animal community and comfortably relegates the hodge-podge of politics to the liberal arts.

The inevitable fusion of the two lines of thought will, perhaps, constitute the outstanding advance of the present century.

Aldo Leopold, 1935

Sixty-five years ago, Aldo Leopold laid down the challenge of developing a science of integrated natural resource management. But a vast gulf still exists between the high priests of theoretical ecology, the gurus of social processes and the real world of resource managers (farmers, fishers and foresters). In this book, we will attempt to understand why the manifestly sensible goal of managing natural resources in an integrated manner has proved so elusive. Our concern is with developing countries and with the effectiveness of attempts to promote ‘sustainable development’ for the vast populations of the world’s poor people.

Many development assistance agencies now aspire to the dual missions of alleviating poverty and conserving the environment. Meanwhile, conservation organisations are claiming that their activities are yielding benefits for the poor. All are implying that natural resources can be managed in ways that achieve immediate benefits for local people whilst sustaining long-term local and global environmental values. However, many critics say that the lack of success of both development and conservation programmes in developing countries results from this confusion of two inherently divergent agendas.

Huge amounts of money have been invested in various approaches to achieving integration in natural resource management. Integrated rural

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development was widely attempted in the 1960s and 1970s but then abandoned. Integrated conservation and development projects came onto the scene in the 1970s but although they are still around their credibility as a development or conservation tool is now seriously questioned.\(^2\) Ecoregional approaches to development, integrated soil and water management projects, ecosystem approaches to conservation, integrated catchment management etc. are the flavours of the first decade of the twenty-first century, but many claim that they are attempts to put old wine into new bottles. Many attempts to integrate complex sets of knowledge and the interests of diverse sets of actors into a common framework have yielded disappointing results. The desire to achieve integration persists but our seeming inability to translate the theories of integration into practical achievements on the ground is leading to widespread disillusion. In frustration, we abandon one set of integrative buzzwords and replace them with others. What is surprising is not the improvement of integrative methods over the past 40 years – rather it is their fundamental similarity. The words have changed but the paradigm remains similar (Box 1.1).

Box 1.1. Integrated natural resource management and its various manifestations

Integrated natural resource management is a conscious process of incorporating the multiple aspects of natural resource use into a system of sustainable management to meet the goals of resource users, managers and other stakeholders (e.g. production, food security, profitability, risk aversion and sustainability goals). To fulfil its aims, an integrated natural resource management approach is necessarily adaptive, interdisciplinary and involves a diverse set of stakeholders.\(^1\)

Integrated catchment management is the process of formulating and implementing a course of action involving natural and human resources in a watershed, taking into account the social, political, economic and institutional factors operating within the watershed and the surrounding river basin and other relevant regions to achieve specific social objectives.\(^2\)

Integrated water resource management is the coordinated planning and management of land, water and other environmental resources for their equitable, efficient and sustainable use.\(^3\)

Community-based natural resource management is the integrated management of a multitude of open-access, common property and privately owned natural resources at the ‘community’ scale.

Integrated rural development was the dominant rural development paradigm of the 1960s. It shared many of the goals of integrated natural resource management as described

in this book but failed because the delivery mode was rooted in a top-down, western-science-knows-best mind-set.

Integrated conservation and development programmes are approaches to management and conservation of natural resources in areas of significant biodiversity value that aim to reconcile biodiversity conservation and socio-economic development interests of multiple stakeholders at local, regional, national and international levels.4

Ecosystem approaches are a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.5 The Convention on Biological Diversity has adopted a set of useful principles that define the ecosystem approach.

Landscape management is a term recently adopted by several international conservation groups, notably the Worldwide Fund for Nature and the International Union for Conservation of Nature and Natural Resources, to describe mosaic landscapes where one seeks to optimise environmental and production functions by managing the different landscape units in a complementary way. The French use the term ‘Aménagement du territoire’ to convey roughly the same meaning.

Adaptive collaborative management is a concept promoted by the Center for International Forestry Research (CIFOR) that is based upon three linked processes: stakeholder interaction, communication and learning among stakeholders, and joint or collective action, resulting in changes or adjustments to management. These changes, in turn, affect the benefits people derive from natural resources and the quality of the resource.6

Multifunctional agriculture or forestry describes agriculture or forestry that deliberately avoids maximising crop yields in order to produce amenity or environmental benefits. The term has been controversial, as it is strongly associated with the European Common Agricultural Policy and its environmental payments, which are seen by competitors as hidden subsidies.

The lack of progress in achieving integration has led many to question its usefulness. Many have argued that the ideal of integration is conceptually appealing but is impossible to achieve in practice. For example, Sedjo (1996) has stated that ‘ecosystem management lacks clear objectives and hence cannot be operationalised on the ground’. Another view, and the one that we will explore in this book, is that the processes, tools and concepts that could underpin a new integrative science are not widely understood and not fully embraced, and that fundamental aspects of the way development science is organised are creating obstacles to change.

Getting researchers from different disciplines to work together with resource managers from different sectors seems sensible and easy enough. In practice, however, there seem to be language and cultural barriers that often bedevil attempts to get diverse groups of people to work together on a common problem. This is not the case in all areas of human endeavour. Large teams of diverse scientists collaborate to launch space probes, develop stunningly complex computer technology and unravel the complexity of life-threatening diseases. In a June 2000 issue of *Science* John Lawton commented that ‘...scientists and engineers from many disciplines routinely work together within institutions and organisations to improve human health. We would be startled if it were not so. The health of the planet is a different story... We lack the organisations to nurture [the required integration]’. The rewards of collaboration and integration for scientific endeavours with commercial applications are enormous, and the costs of reductionism are failure, bankruptcy and obscurity. However, the markets for the public goods products of integrated natural resource science are embryonic, at least in the developing world. Most natural resource organisations still reward individual achievement and fail to provide an environment where multidisciplinary teams and integration can flourish.

Nowhere is the need for integration and collaboration greater than in addressing the environmental problems confronting the developing world today. Yet most natural resource managers and researchers remain tied to their laboratories or their experimental plots. The costs of not integrating and not collaborating are colossal: the progressive deterioration of the agricultural, forestry and fishery systems upon which all life depends. These costs are not born by the scientists and government resource managers; the costs are manifest in the suffering of resource-poor farmers and deterioration of the quality of life of society at large.

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THE CHALLENGES FACING RESEARCH

In this book, we will attempt to show why integrative approaches are essential and to demonstrate that successes from integrative science are possible and practical. We will attempt to elucidate the key processes, tools and concepts that need to be embraced if integration in natural resource management is to become operational on a scale sufficient to confront the crisis of achieving sustainable development.

The challenges facing research

The work of the research centres of the Consultative Group for International Agricultural Research (CGIAR) formed the basis of the green revolution. Scientific reviews and activist non-governmental organisations (NGOs) have all attacked the CGIAR for focusing on technological solutions to the problems of the poor and ignoring the complex realities of their lives. Critics have focused on the harmful social and environmental externalities caused by some of the agricultural innovations that the CGIAR has produced. The harsh reality is that the benefits of more efficient production of commodity crops may accrue to better-endowed farmers and to urban consumers. The poorest of the poor may not have access to these innovations and may be further marginalised by them.

Jacqueline Ashby of the International Center for Tropical Agriculture (CIAT) at Cali in Colombia has been a leader in exploring the scientific basis for integration and participation in the work of the CGIAR. She has been responding in part to the drastic decline in the status and credibility of mainstream agricultural science since the Nobel prize-winning heights of the green revolution. In a recent article in *Conservation Ecology*, she claims that many now see conventional agriculture as a threat to the environment and to human health.5 The perceived risks in the way food is produced and the effects of new food production technologies on the health of humans and ecosystems have become major political issues and topics for headline news. When the CGIAR was established in the 1960s, agriculture was seen as a major part of the solution to the development problems of the Third World; today, a significant body of opinion sees modern agriculture as a major part of the problem.

However, advances in agricultural science are still essential if we are to achieve the yield increases needed to meet the world's food requirements. The globalisation of trade and the food needs of a burgeoning world

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population will drive this process in the direction of the intensive production of uniform crop varieties by large-scale agro-industries. Poor farmers will not be able to compete in markets with modern industrial agriculture and will either have to seek their fortunes off the land or be relegated to a marginal subsistence existence. The idea that over a billion very poor farmers can be absorbed into manufacturing and services requires an exceedingly optimistic view of the potential for continuing global economic expansion. Furthermore, many fear that while food needs may be met under this scenario, it will be at the expense of climate, biodiversity and amenity values. For example, the World Conservation Strategy advocates ‘reducing excessive [crop] yields to sustainable levels’.

Examples of well-documented public distrust in agricultural science and policy abound. Two examples are the ‘mad-cow disease’ scandal in the UK and the growing, international antipathy to genetically modified organisms and to uniform plantations of fast growing clonal trees.

The focus of this book is on attempts by governments and development assistance agencies to improve the livelihoods of poor people in the developing world. These poor people depend upon the ‘natural capital’ that supports their lives just as much as they do on the more tangible assets of money and property. Natural capital is the soil, water, climate and biodiversity upon which functioning ecosystems depend. People’s concerns may be driven by a conservation ethic but this has its origins in compelling evidence of the poverty, famine and natural disasters that result from degraded ecosystems. The resilience of the poor in the face of external shocks such as war, climate variation and indebtedness depends on natural capital. The diversity of nature and the health of ecosystems are essential to people’s survival in a turbulent and constantly changing world.

In recent years, political support for investing development assistance money in natural resources research has weakened. Instead, funds are being channelled to better governance, public sector adjustment, disaster relief and the mitigation of environmental problems. There is a notable decline in support for agriculture, a reflection of the disenchantment with industrialised agriculture in high-income countries and the perception that development assistance to agriculture has not delivered the benefits that it promised. Agricultural research is not unique in this loss of credibility.

Robert Chambers of the Institute for Development Studies at the University of Sussex in the UK has analysed the way in which rural development practitioners have gone through a process of being proved consistently wrong and have lost credibility for their claims. In the same vein, critics of mainstream agricultural science claim that the research establishment ‘is incapable of delivering social equity, economic efficiency and ecological integrity in response to the decline of rural society and deepening crises in the depletion and degradation of water, soils, flora and fauna’. The rates of return on investment in agriculture for developing low-income countries have indeed been disappointing. There is evidence that returns on investments in agricultural development projects have been even lower than in sectors such as health or education. The gains from agricultural projects are often not sustained after external donors withdraw. Proponents of organisational change to support the development of sustainable agriculture do not always see a role for science in this process. Röling and Jiggins state that ‘the old role of developing technologies for farmers seems to clash with the logic of [providing farmers with the adaptive skills to practice] ecologically sound farming, while a new role [for research] . . . seems not to have clearly emerged’.

In the 1960s, a huge gap existed between the technologies used by resource managers in developed countries and those available to poor farmers and resource managers in the tropics and subtropics. The main objective of development assistance during the following 40 years was an attempt to transfer or adapt advanced technologies to conditions in poor tropical countries. These efforts are widely credited with having averted the large-scale famines that had been anticipated in Asia in the 1970s and 1980s. Major investments went into genetic improvement of a few commodity crops to enhance productivity and improve resistance to pests and diseases. The gains were largely confined to areas of high agricultural potential and they often benefited more prosperous farmers, missing the poorest of the poor. The initial spectacular gains in productivity of the green revolution

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are unlikely to be repeated. The impacts of such research have been more modest in addressing the needs of Africa.

Green revolution science underestimated the complexity of the systems in which small-scale producers operate. Crop production, for example, is usually only a small part of a broad livelihood portfolio that may encompass a wide variety of off-farm activities such as the gathering of forest products and the raising of livestock (see Fig. 6.3, p. 131). Productivity enhancement is important but risk reduction, improved food security and the maintenance of natural and social capital are also vital. The farming systems of poor people in the tropics are subject to a multitude of exogenous influences. For instance, in semi-arid areas they are subject to highly variable rainfall. Economic conditions may change rapidly, with resulting swings in input costs and market prices. Other external shocks such as the massive rise in the acquired immunodeficiency syndrome (AIDS) in Africa or the widespread fires associated with El Niño events throughout the tropics all disrupt local resource management systems. Agricultural innovations must not only increase productivity, they must also help the poor to deal with the vagaries of their social, economic and biophysical environment.

Mainstream agricultural science has tended to try and reduce agricultural systems to their components. While reductionism has been crucial in the gains that have been achieved, it can miss the mark, as we illustrate in Chapter 6. Development assistance to agriculture has largely ignored the off-farm environment. In mainstream agricultural science, natural resource management has been synonymous with location-specific, adaptive research, mainly concerned with maintaining soil fertility. There have been few systematic attempts to help poor farmers to be resilient to the impacts of external economic, social or climatic changes.

Much development science has been portrayed as being in support of short-term growth at any cost. In many cases, agricultural research yielded short-term productivity gains at the expense of long-term degradation of the natural capital of soils, water, biodiversity and non-cultivated land. Much of this research targeted innovations that could yield quick benefits to respond to urgent needs. Researchers were committed to technologies that maximised biological uniformity and ignored the biological diversity and ecological services that might contribute to the stability and resilience of natural ecosystems. Good historical reasons explain this focus, and extensive critiques, justifications and rebuttals of it abound. It is argued that this sort of science poses threats to the fragile societies and poor people of many

Dysfunctional development assistance projects

Dysfunctional development assistance projects

This book deals mainly with attempts to use international development assistance to address the natural resource problems of poor countries. The need for accountability and for donors to be able to target their support precisely has led to the emergence of the ‘development project’ as the main delivery mechanism for this aid. Donors work with their national counterparts to define discrete, time-bound, packages of development assistance. This enables the donor to identify with, and claim credit for, individual components of the broad development agenda of the recipient country. It allows the donor to apply its own accountability mechanisms and, significantly, it allows development to be reduced to bite-sized components for which donors can assume responsibility.

The construction of a road or bridge is readily amenable to the ‘project’ approach. Such activities can easily be packaged as a discrete, time-bound, pre-planned project. However, the problem with natural resources is that they are components of large complex landscapes. Diverse interest groups impinge upon them. They are subject to unpredictable pressures resulting from changes in local economies, access to markets, population develop countries. Poor countries lack formal safety nets to see their people through periods of crisis. Poor people lack the financial capital to help them to deal with crop failures caused by diseases, infrastructure breakdown, social turmoil or extreme climatic events. The capital that enables these people to deal with difficult times is the social capital that allows them to cooperate and share scarce resources. But they also need the natural capital of a diverse resource base to provide them with a range of options. The immediate need may be to see them through periods of environmental, economic or social stress, but the long-term need is for a natural resource base that can provide a range of options for economic growth and social development.

In many situations, there are clear trade-offs between productivity enhancement and price minimisation on the one hand and caring for social values and ecosystem health on the other. At present, the incentives in developing countries encourage producers to shift any environmental or social costs onto others. Individual farmers are faced with the stark reality that they will produce less and make less profit if they bear the full cost of resource conservation measures. The result is that many social and environmental costs are born by society at large rather than by individual resource managers. Development assistance has done little to help poor countries to build institutions to deal with these ‘externalities’.