

1. Introduction

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UNDERSTANDING LAND USE POLICIES AND SUSTAINABLE DEVELOPMENT

The urgency to enhance sustainable development (SD) in developing countries is at its peak: in many cases poverty levels are growing and food security is deteriorating; land conversions are uncontrolled; loss of biodiversity through land use change is high; pressure on forested areas is high; and land reforms are vital to sustain productivity, reduce food vulnerability, alleviate poverty and conserve forests. This urgency is expressed globally through various explicit commitments and interventions: notably the delineation (UN, 2000) and assessments (MEA, 2005) of the Millennium Development Goals (MDGs).

Research on the impact of land use policies on the sustainable development of developing countries is complex, and it is essential that we properly understand this. Land use policies are key to the achievement of the MDGs. As Vosti and Reardon (1997) state, policy makers in developing countries are faced with the need to pursue three challenging goals simultaneously. Agricultural production must grow to keep up with rapidly increasing populations; and increased crop production will have to come from higher yields, not more land under the plough. Poverty alleviation is essential, for poverty ruins livelihoods, increases food insecurity and undermines development, the environment and political stability. At the same time, our natural resource base must not be destroyed, but must be used in a more sustainable manner.

The successful implementation of land use policies has in the past often been hampered by the fact that we simply do not know enough about their impact on sustainable development across developing countries. The aim of this book is to contribute to bridging this knowledge gap and in doing so to facilitate the successful design and implementation of land use policies. The potential role that land use policy could play in the sustainable development of developing countries has not

always been based on assessments using environmental–economic–social variables collectively; thus its role is insufficiently understood (see related sustainable development discussions in Egunjobi, 1993; Kates et al., 2001; Birdsall et al., 2005; Mooney et al., 2005; Wood and Lenne, 2005). Generic and flexible tools and methods that can be applied to a range of conditions, covering diverse ecosystems and sectors in developing countries to perform policy impact assessments are often inadequately developed.

Although much work has looked at land use policies and sustainable development (such as Egunjobi, 1993; Shove et al., 1998; Smith et al., 2000; Nair, 2001; Evans, 2003; Niazi, 2003; Wood and Lenne, 2005), few tools have been developed that can be applied in a generic manner to understand the causal relations underlying land use policies and sustainable development. Methods for policy impact assessments that can be applied to a range of conditions covering diverse ecosystems and sectors in developing countries are often inadequately developed. Thorough theoretical and empirical research into the effects of land use policies on the sustainable development of developing countries is still very much needed if we are to ensure the achievement of the Millennium Development Goals. Research has focused on specific, and often single, issues, such as land reform, nutrient depletion, soil mining and conservation, reforestation, intensification, land management regimes, natural resource conservation, and so on, Broch-Due and Schroeder (2000); Pagiola (1996); Urama (2005)). There is still a great need for cross-national comparisons that assess the impact of land use policies on sustainable development in developing countries as well as modelling tools that are tested in a range of conditions. The methodologies described in this book may be adapted to changing land use practices and priorities, which vary across developing nations.

Policy makers often do not have sufficient access to scientific decision supporting tools that enable them to implement strategies with the aim of enhancing sustainable development. Land use policies are especially critical in the poorest countries in their efforts to achieve poverty reduction, and there are few cross-country assessments to learn from. An understanding based on such assessments is vital; for example, drawing attention to the importance of trade, which is often underestimated, questioning whether loss of biodiversity through choices in land use changes is associated with local livelihoods and markets, or demonstrating how intensification, which leads to soil mining, can favour resource-strong groups.

THE NEED TO ENHANCE SUSTAINABLE DEVELOPMENT

Mankind has experienced economic development in the last hundred years at a historically unparalleled rate. We produce more goods than were ever thought possible, and we continuously create new substances to further increase production, including synthetic pesticides and herbicides, while crops/ agro-biodiversity are manipulated to produce more and at greater speed. However, the consequences for ecosystem functioning are in several regions severe, due to population growth, agricultural intensification and expansion, sedentarization and conversion of forest land to agricultural land. The UNEP report (2010) informs us that the state of the environment has never been worse; 60 per cent of the world's ecosystems are already degraded, and the capacity of many ecosystems to meet the growing demand for ecosystem services such as food and water is diminishing. The impact of economic growth on human well-being is mixed. Health and wealth have on average improved, but the benefits are unequally distributed, and further improvement may be limited by an insufficient supply of key ecosystem services (MEA, 2005). Currently 1.1 billion people survive on an income of less than USD1 per day, and 70 per cent of them live in rural areas where they are highly dependent on ecosystem services.

Global agreements have been established to encourage trade, mitigate climate change, and promote equity in the use and conservation of biodiversity. It is in this context important to recognize that strong synergies exist between improving human well-being and environmental protection. Humankind benefits from a multitude of resources and processes that are supplied by natural ecosystems. Agriculture is the main economic basis in rural areas, and is strongly associated with natural resource use. Today, production capabilities of agricultural systems are undermined by soil erosion and salinization (as exemplified by case studies in this book). Degradation of soil and vegetation cover has negative effects on agricultural productivity since natural ecosystems regulate water, prevent soil erosion and support the pollination of crops. In some developing countries still up to 80 per cent of the population depend on agriculture for their livelihoods. Eradication of extreme poverty and hunger depends on sustainable agriculture, fisheries and forestry, which in turn rely on ecosystem services such as soil fertility and water.

Within the frames of the above commitments, land use changes in developing countries are considered critical to sustainable development; and land use policy (see Chapter 13 in this volume) is an important tool to control land use conversion. In order to address land use change, it

is essential to understand the impact of land use policy on sustainable development. The selection of optimal policies requires a good understanding of the key driving forces in the area, including human activities such as immigration and agricultural intensification, and underlying factors, such as human population dynamics or economic growth that underpin the proximate causes and either operate at the local level or have an indirect impact from the national or global level. The institutional context determines whether the selected policies can be effectively and successfully implemented. To understand this complexity of interacting factors, a holistic and integrated approach is required, drawing on various disciplines and assessing the combined effects of socio-economic, environmental and institutional factors. Meeting the challenges facing sustainable development in developing countries requires a proper understanding of the linkages between rural development, poverty reduction (particularly food security and enhancing livelihood quality) and environmental management.

The book presents arguments about why *ex-ante* analysis of land use policies for sustainable development in developing countries is urgently needed. Assessment procedures are provided, making use of a generic and flexible analytical framework (Chapter 4) that enables understanding of the effect of different land use policies on sustainable development. This analytical framework covers all the necessary steps in an *ex-ante* impact assessment – from problem identification to communication of assessment results. It has been applied in seven case study countries in Africa, Asia and Latin America, differing considerably with regard to the economic, environmental and social dimensions. The first stage in the analysis described in the case study chapters is based on the Driving forces, Pressure, State, Impact and Responses (DPSIR) framework. This presents the trade-offs that exist between the three dimensions of SD: in many cases economic development on one side and environment and social equity on the other. These trade-offs, related to the potential or actual conflict between development and the environment, also appear as trade-offs between the interests of present and future generations. Selecting the appropriate policy option then requires making value trade-offs, based on the views of stakeholders and experts.

THE STRUCTURE OF THE BOOK

Following the Introduction, Chapter 2 by von Braun explores the sustainability and advancement of agriculture in low-income countries in the context of current challenges: the global food and financial crises, climate

change, and increased competition for natural resources under population and economic growth pressures. It stresses the need for a comprehensive strategic initiative for technological and institutional innovations on a global scale and related investment action to support agriculture and sustainable development – led by an ethical approach and underpinned by the purpose of achieving sustainable livelihoods for all.

Chapter 3, on institutions and sustainable development, clarifies some of the central concepts relevant to the book, and discusses potential trade-offs between sustainable development objectives: economic, social and environmental. The governance dimension of sustainable development is identified, with particular reference to land use, demonstrating the crucial part that this plays when it comes to translating desired objectives into policies and effective implementation.

Chapter 4 presents the analytical framework adopted in the volume, showing how it draws on and combines the models developed in two previous major investigations adopted in Europe, supplemented where appropriate by other methods. The main emphasis is on the pre-modelling phase, but the modelling and post-modelling phases are also summarized. The challenge of modelling land use changes in response to changes in the policy environment – macro policy, agricultural and forest policy, environmental policy – is explored with a focus on developing countries.

Part II presents the seven different case studies in the volume. In each case the chapters identify the central issue, the sustainable development problem in its environmental, economic and social dimensions. The inter-related causes of the situation are analysed by identifying key drivers and selected land use policies of particular relevance. Indicators are selected for the assessment of land use policies. Prioritized land use policies are discussed in relation to their potential impact.

Chapter 5, the case study on Taihu Lake in China, exemplifies the conflict between two dimensions of sustainable development: economic development and conservation of the environment. Since the 1980s, the water in the major rivers running into Lake Taihu, and in the lake itself, has become seriously polluted, and the nitrogen and phosphorus eutrophication of water have become major environmental problems. This case study focuses especially on the agricultural sector and on policies to improve water quality in the lake and sustainable development more broadly.

Chapter 6, the case study in Tunisia, concerns the complex interaction between socio-economic development and environmental degradation. Increasing human needs and agricultural development have led to very high pressures on the fragile natural resources of the basin. Land degradation is becoming increasingly serious due to increased sedentarization, land fragmentation and growth of the agricultural sector. The case

study focuses primarily on two environmental policies: 'Water and soil conservation strategies', and the 'Policy of saving water and incentives to irrigation'.

Chapter 7, the case study in Mali, concerns the irrigation scheme, the 'Office du Niger', an irrigation scheme created for rice production. Droughts in the Sahel area and particularly in Mali have caused people to migrate to the Office du Niger. The increasing population has led to competition over land, deforestation and water pollution. Extension policies and privatization of land have been implemented by the government with the aim of enhancing food security. Policies to be assessed are related to the scarce natural resources and the coexistence of pastoralists and farmers in the area.

The main problem to be addressed in Chapter 8's case study of Indonesia, the province of Yogyakarta special region (DIY) is uncontrolled land use change from agriculture to non-agricultural use. The rapid urbanization and migration into the area have become threats to both the environmental and the social dimensions of sustainable development. The chapter discusses the feedback mechanisms behind this change in land use and addresses several related policies: planning policies, development policies and agricultural policies.

Chapter 9, the case study in Kenya, is concerned with an increasing population leading to uneconomic land fragmentation and land degradation. Poor growth in the agricultural sector has been attributed to land degradation, increased droughts and floods, inadequate markets and marketing infrastructure. The main policy assessed is that concerning land tenure, whereby private land rights are protected at the expense of the customary land tenure holders.

Chapter 10, the case study in India, covers selected districts in Northern Karnataka and illustrates how the social, or poverty, dimension of sustainable development interacts with the economic and environmental dimensions. India has experienced rapid economic growth in recent years, and like many other parts of the country Karnataka has witnessed a commercialization of agriculture in terms of input application, choice of crops and marketing of products. The inherent risks involved in inputs for intensive commercial crops are high, especially for small-scale farmers. The chapter focuses on policies; for the commercialization of agriculture, and for land use conversion.

Chapter 11, on Brazil, concerns deforestation in the Amazon region related to the paving of the full length of the 1780 km federal highway BR-163, which crosses part of the states of Mato Grosso and Pará. The motivation for this investment is to promote economic development in rural areas, but it has major side-effects on biodiversity loss and CO₂ emissions.

The demand for commodities as a driver of this development is discussed, along with the impact of weak governance in relation to conservation and sustainable use policies, colonization and land reform programmes, and infrastructure projects.

Part III emphasizes comparative aspects of the case studies.

Chapter 12's comparison of case studies draws on the analysis in Part I and the case studies in Part II to identify similarities and differences in the seven case studies: do common factors emerge as determinants of the current situation, and what are the different value trade-offs taken when identifying policy options? Broadly, the points of comparison follow the different issues as included in the case studies.

Chapter 13 presents a land use typology which distinguishes between types of policy (sectoral, integrated and so on), areas and means of intervention (market incentives, government regulation and so on) and levels of intervention (from local to international). Four predominant types are identified, and these are assessed in terms of their links to the various dimensions of sustainable development, likelihood of effective implementation and so forth.

Chapter 14 concludes the book by presenting overall policy recommendations, and highlighting lessons learned from our experiences in these seven case studies. Emphasis is placed on the need for participatory approaches to ensure local knowledge and anchoring of initiatives, and of the need for an integrated and forward-looking approach to policy making to protect the environment and alleviate poverty in developing countries.

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