Executive Summary

What are distributive effects and why do they matter?

Policies to maintain and improve biologically diverse habitats and ecosystems aim to benefit society as a whole by realising all of biodiversity's values: material benefits, as well as those that are less easily quantified. However, like any other environmental policy, while biodiversity policies can improve aggregate well-being, they can also create winners and losers. For example, in developed countries limitations on land use to protect biodiversity can sometimes reduce income to the individual landowner, but deliver benefits to the general public. In developing countries where natural resources are an important livelihood source for people, biodiversity protection can reduce access to these natural resources, thus imposing a cost on poorer people. These are the "distributive effects" of biodiversity policies and they are important to understand for the following reasons:

- Ignoring the distributive impacts can imperil a policy that would otherwise be beneficial for the general public.
- Policy-makers are under increased pressure to demonstrate that their policies are informed by and comply with criteria emanating from global policy discourses such as the Millennium Development Goals. These criteria frequently contain explicit distributive objectives with little or no guidance on how to fit biodiversity policies around them.
- OECD policy guidelines (OECD, 1997) require policy-makers to assess the distributive effects of policy interventions on the absolute and relative well-being of different groups of people.

Distributive effects are conceptually different from efficiency effects (gains) in biodiversity or other environmental policies. A policy's efficiency effects are the benefits or welfare gains that a policy achieves over and beyond the costs incurred. Traditionally, separating distributive from efficiency effects has been a hallmark of economic analysis. The reason is simple: efficient policies will maximise the benefits from a given level of inputs of natural resources, capital and labour. These maximised social gains can then be redistributed according

to society's preferences. However, this book argues that such separation is often not useful for biodiversity policies (see below).

The aim of this book is to help policy-makers who are responsible for designing and implementing biodiversity policies understand the relevance of distributive issues (for both equity and efficiency), and how to integrate them into policy formulation. In this book we analyse the distributive impacts of biodiversity policies across different groups, geographical scales and time. We describe the methods for measuring distributive effects and explain the relationship between policy objectives, instrument choice and distributive outcomes. We provide arguments for integrating distributive issues into biodiversity policies. We also offer different methods for addressing distributional concerns in policy-making and for managing conflicts induced by biodiversity policies. Finally, we present a wealth of case studies to document both the complex chains leading to distributive outcomes and best practice in merging efficiency and equity considerations in policy design, implementation, and management.

The distribution of costs and benefits over time and space

In order to analyse the distributive effects of biodiversity policies, the benefits and costs of the policy first need to be identified. We also need to understand how benefits and costs vary across different groups geographically and over time.

The implementation of biodiversity policies has implications both for international equity between countries and between very different economic groups. This is because any costs of implementing biodiversity policies are frequently concentrated locally – in those areas where biodiversity is actually managed and to those people who can afford them least. For example, costs may be borne by those whose access is restricted to the protected biodiversity or whose property is damaged by an increase in biodiversity. At the same time, many of the policy's benefits may be felt many hundreds or thousands of miles away, by individuals or groups who depend less directly on the protected area.

Local benefits *can* be significant, but this depends on the policy mode applied. For example, management regimes for protected areas which ensure income to local people from tourism can compensate them for livelihood losses. Clearly defined systems for encouraging or allocating financial benefits for locals can underpin that outcome.

The varying time scales over which biodiversity policies are felt also create distributive impacts that need to be studied. Policy decisions today may affect

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individuals currently alive differently to future generations. The policy-making process therefore needs to compare benefits and costs of biodiversity policies that may arise at vastly different points in time and justify them against some measure of intergenerational equity. But comparisons across time raise questions about how to measure trade-offs both within a generation, as well as across generations. For example, if the costs have to be incurred right away (*e.g.* curtailing economic growth now) while the benefits occur at some stage in the future (reduced global warming), then how do we compare flows at such different points in time?

Who benefits from and who pays for biodiversity policies?

Biodiversity and ecosystems are important as key productive assets (*e.g.* fish, or timber), for the "services" they provide (*e.g.* as carbon sinks or in water purification) now or in the future, and for the sheer pleasure we get from their continued existence (aesthetic values, cultural values, etc.). Economists use distinct value categories to capture these various sources of biodiversity's contribution to human wellbeing, with the most fundamental categories being those of use and non-use values. Taken together, these value categories make up the total economic value (TEV) of biodiversity, *i.e.* the total contribution of biodiversity to humanity (Pearce and Moran, 1994). The concept of the TEV allows us to evaluate the benefits of policies that affect the availability of biodiversity. It does so by assessing the changes in the values within each value category of the TEV that occur as a result of the policy. When a policy sacrifices more benefits of biodiversity than are gained from its loss at the margin, then this policy should not be allowed to proceed.*

Against the list of benefits identified through TEV, we must compare the costs – monetary and otherwise – of maintaining/procuring these goods and services through biodiversity protection. For policy-makers to decide which policy is the most appropriate, these costs of biodiversity policies also need to be accounted for. The costs of biodiversity policies can be categorised into:

- **Direct costs** of implementing the policy, *e.g.* budgetary expenses raised through taxation. These costs tend to affect governments and are generally smaller than other costs.
- **Indirect costs:** *e.g.* crop losses at the boundaries of protected areas as a result of increased wildlife population levels. Exposure to these costs will be

* That is, the incremental social loss (material and non-material) should be offset by the incremental gain from the reduction of biodiversity.

higher for those more reliant on extractive and consumptive activities in, or adjacent to, a conservation area.

- **Opportunity costs:** the value of lost consumption possibilities previously exercised and no longer possible, or of future consumption possibilities. These opportunity costs are the main costs associated with biodiversity policies.

We also need to remember that households with different incomes rely on very different goods and services generated by biologically diverse ecosystems and habitats. The most important interaction between low income households and their natural environment in developing countries is through extractive and consumptive activities. Richer households are more likely to be interested in the public goods aspects of biodiversity (aesthetic values, ecosystem services, etc.) as their income is less likely to depend directly on primary resources.

Though the results are mixed, research generally shows that biodiversity policies that enhance the supply of biodiversity-related goods and services will typically generate greater benefits for the better-off, and sometimes impose net costs on the less well-off. Furthermore, biodiversity is mostly (though not exclusively) found in developing countries, where income levels are somewhat lower than in most OECD countries. In many cases a significant share of the non-use benefits of conserving biodiversity in these countries might accrue to developed countries. This asymmetric distribution is another key dimension of distributive issues at the international level.

Policy type and mode also have distributive effects (Table 0.1):

- **Voluntary *versus* non-voluntary policies.** Voluntary policies, such as conservation easements or payments for ecosystem services, allow potential participants to decide whether to contribute to the policy or not. Non-voluntary biodiversity policies force individuals to participate in the policy. Examples are restrictions on property rights, *e.g.* by banning land development; or taxes and fees, *e.g.* a pesticides tax. On the one hand, non-voluntary instruments will – as a rule – produce individual losers, creating incentives for losers to undermine the policy. On the other hand, such policies can generate significant net benefits at the aggregate level (despite the few individual losers). Handling this trade-off between the creation of losers and viability of the policy in the face of losers' opposition is one of the key challenges in the design of conservation policies that this book explores.
- **Reward-based *versus* property-based policies.** Reward-based policies leave it to the policy participant to decide how much of a certain activity is carried out, but specify a fee that typically increases with the volume of the activity being carried out. Property-based policies leave it to the market to

Table 0.1. **Classification of policy instruments**

Policy mode	Participation	
	Voluntary	Involuntary
Change in property and use rights	***Type II*** Land purchase Conservation easements	***Type IV*** Designation of protected areas Land use regulations Trade restrictions
Distributive effects	*No evidence of losers; however, some gain more than others,* i.e. *those with more assets, especially land*	*Sharp reduction of access or livelihood for some; enhancement of livelihood for others* *Gain in indirect benefits for larger number of people*
Change in rewards	***Type I*** (Public) payments for ecosystem services Market creation Product certification	***Type III*** Biodiversity-related taxes User fees Removal of perverse incentives
Distributive effects	*Few people suffer direct losses from the policy, but some will see relative prices change in the market, which may affect them adversely*	*There will be losers if the welfare gains from an increase in biodiversity are less than the increase in taxes an individual must pay to finance the policy*

determine the value of the activity, but ensure that the conditions for the market to do so are present.

The relationship between instrument choice and distributive impacts shows that policy-makers have considerable scope for assigning the benefits and costs to different groups depending on which instruments they choose. However, there are trade-offs between the desirability of being able to fully implement policy (which calls for coercive instruments) and the desirability of being able to avoid creating a high volume or a high individual incidence of policy losers (which calls for voluntary instruments). Historically, this trade-off has led to a strong bias towards policies that combine coercion with changes in property rights. The result has often been problematic distributive outcomes and a failure of the policy on the ground. Other approaches, such as tax-based measures, seem underexploited in their potential to strike a middle ground in this trade-off.

How do we measure the distributive impacts of biodiversity policies?

The Table 0.2 compares the most important methods for measuring the distributive effects of biodiversity policies, and describes when they are most appropriate.

Deciding which method to choose depends on the policy measure, the geographical scale, and data availability. Each of the methods has particular strengths in terms of capturing distributive effects, and weaknesses in terms of either omitting important dimensions or not allowing some type of aggregation to be carried out.

How do we avoid the distributional impacts of biodiversity policies?

According to the basic model of welfare economics, policies aimed at correcting externalities (such as biodiversity policies) should be separate from policies with redistributive objectives. Separating equity and efficiency objectives leaves biodiversity policies unencumbered by additional constraints and obligations and free to pursue those policy options that promise to deliver the greatest social gains. These maximised social gains generated by the biodiversity policy are then available for redistribution to those made worse-off by the policy. However, for biodiversity policies there are a number of fundamental and practical reasons why such separation is not always possible, and why implementing biodiversity policies which do not incorporate distributive aspects may involve serious efficiency losses:

- The "public good" nature of many of biodiversity's goods and services.
- The transaction costs of moving a dollar from one person to another.
- Incomplete information about the nature of the policy and its impacts.
- Frequent lack of geographical overlap between the winners and losers and the scope of the institution making the transfers.
- The nature of common property resource management systems, where a small redistribution from rich to poor can induce a collapse of conservation efforts if the need for policy has not been made clear and hostility to such efforts is induced.
- The changes in distributive impacts of biodiversity policies over time: there are few functional mechanisms for transfers across generations.

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Table 0.2. **Advantages and disadvantages of the key methods for measuring distributive effects of biodiversity policies**

Method	Strengths	Weaknesses	Applications	Examples
Measures of equality of income distribution (Lorenz curve, Gini coefficient)	Graphical illustration and numerical measure of equality	Cannot be used in a very complex situation. Large statistical data requirements	Can be used for a well-defined group	Measures of equality of income distribution impacts of privatisation of mangroves in Viet Nam
Extended cost-benefit analysis (by stakeholder groups)	Gives quantitative results segregated by stakeholder groups	Extensive statistical data are needed	At both national and local level, where income or stakeholder groups can be easily identified. Where monetary valuation of both costs and benefits is possible	Three potential park scenarios in the Ream National Park, Cambodia. Three scenarios in the Leuser National Park, Sumatra
Social accounting matrix (SAM)	Shows the flow of income from one sector to another	Extensive statistical data are needed; rather complicated method. Problematic where no financial information is available	Can be used in local, regional and national circumstances	Distributional impacts of alternative forest management of the Upper Great Lakes region, USA
Distributional weights	Can compare efficiency and distributive impacts on a common scale	Extensive statistical data and assumptions about utility function are needed	Both national and local level where income groups or stakeholder groups can be easily identified. Where monetary valuation of both costs and benefits are possible	*UK Green Book*
Atkinson inequality index	Uses normative judgements about social welfare	Has been used only in the narrow field of income studies. Applicability to biodiversity policies is still an open question	Can be used at international, national, and local levels to the extent that normative judgements can be plausibly applied in the chosen context	No example related to biodiversity policy yet
Employment-based analysis	Unconventional, straightforward measure of the level of employment	Income changes cannot be measured by this method. Cannot capture other social effects. May hide important dimensions of job status, qualification match and labour market frictions	In rural areas, where employment changes are more important than the changes in the income level	Measuring the employment impact of different farming activities, Yucatan, Mexico

Table 0.2. **Advantages and disadvantages of the key methods for measuring distributive effects of biodiversity policies** *(cont.)*

Method	Strengths	Weaknesses	Applications	Examples
Child nutritional health status	Unconventional, straightforward measure of the nutritional status of children	Nutritional status depends on many factors. Former calculations had statistical and other problems	In developing countries, where it is difficult to use other measures and where nutrition can have direct link to biodiversity policy measures	Measuring nutritional status of children in marine protected areas in the Philippines
Stochastic dominance analysis	Multidimensional analysis of the distribution of social welfare (not only income and wealth, but others, *e.g.* education or health)	Strong assumptions are needed about how the dimensions relate to welfare, and social weights need to be given to different dimensions	At local, regional or national level	The Human Development Index of the United Nations
Multi-criteria analysis (MCA)	A wide range of distributive effects can be measured using social and economic criteria: the level of measurement is not a problem. It can be a base for further discussion with stakeholders and for assessing trade-offs	Results heavily depend on the weights given to the criteria (weights can be given by experts, stakeholders or policy-makers)	In local, regional and national situations, and in complex cases when many criteria need to be taken into account, and where some of the effects cannot be measured in monetary terms	Australian forest policy. Buccoo Reef Marine Park, Tobago. Šúr wetland nature reserve, Slovakia
Social impact assessment (SIA)	Impacts on stakeholders and distributive effects are assessed. All other methods can be used for the assessment	Sometimes it is superficial and lacks monetary data (if there is no clear guidance or indicators given)	In any policy situations at local, regional and national level	Stakeholder analysis in the Royal Bardia National Park, Nepal.
Hyperbolic discounting techniques	Allow future generations to be explicitly considered. Potentially reduce distributive impacts across generations	Can be inconsistent since a decision taken today would not be taken tomorrow, even if nothing changes	Any policy whose effects will last more than about 10 years	*UK Green Book*

- Political economy considerations: entrenched interests and political power cannot easily be separated from the policy itself and can have a range of distributive impacts.
- Conflict, which can be costly and expensive to resolve.

Some of these efficiency losses will be very palpable, as in the case of conflicts arising around conservation policies. Others will be large, but only evident to future generations. Some may be difficult to foresee at the time of planning, since groups, individuals and institutions will change their behaviour over

time. But they all imply that biodiversity policy approaches which consider distributive issues from the start are likely to be more efficient and effective.

Integrating efficiency and equity into biodiversity policies

This study suggests four approaches for integrating distributive issues into biodiversity policies, in increasing order of complexity and hand-over of control by the policy-maker:

- Methodological: use the methodologies identified in this book (Chapters 2 to 4) to better understand and account for the welfare impacts in policy design. This means that the policy-making process is now augmented by a consideration of distributive impacts. At the same time, the policy-maker still retains full control over information gathering, policy evaluation and choice, and instrument choice.
- Procedural: enrich the policy-making process by using consultative and participatory approaches to involve those who will be directly affected by biodiversity policies. Effective consultation allows various groups to express their views so potential conflicts can be addressed and acceptable solutions developed.
- Institutional: accompany biodiversity policies with explicit changes to the institutional structure under which individuals and groups take decisions that affect the target habitats and ecosystems. These may include creating property rights and entitlements as well as novel markets and contract schemes in order to manage distributive impacts.
- Combined: bring together the second and third approaches above. Thus, institutional changes allow affected individuals, households and groups to become actively involved in policy decision-making on an ongoing or even permanent basis. In its most extensive form, this includes measures that devolve to individuals or groups affected part of the management of the policy. Using participatory methods in the design of the biodiversity policy measure can help identify and mitigate the distributive effects of the policy measure in a way that is satisfactory for the public and for the stakeholders. It can also prevent conflicts and secure the successful implementation of the measure. However, participatory methods require considerably more time, additional resources and special training for policy-makers.

A key message is that there is a general shift away from recommending "one-size fits all" solutions. There is a wide and growing base of documented policy experience available in merging efficiency and equity objectives and best-practice examples for a wide variety of institutional and ecological settings. This book discusses a wide range of conceptual and methodological issues, and also uses numerous examples to illustrate how they have been implemented in practice.