INSTITUTIONS, SUSTAINABILITY, AND NATURAL RESOURCES

Institutions, Sustainability, and Natural Resources

Institutions for Sustainable Forest Management

Edited by

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John Hartwick has taught at Queen's, Kingston, Ontario, since 1969. He has published in leading economics journals on urban structure and on exhaustible resources. In the 1970's he became interested in the idea of compensating the next generation for resource stock depletion by bequeathing them more produced capital, equal to the value of the current natural resource draw-down. A more general treatment of this issue is forthcoming in the Canadian Journal of Economics, with Kirk Hamilton. A recent pre-occupation has been the economic nature of sustained motion in classical mechanics. Capital theory turns out to be well-suited to this analysis. His work on deforestation has focused on the way a "new country" adjusts its land-use in the face of new external prices for its primary product exports.

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PREFACE AND ACKNOWLEDGMENTS

In the short-term human beliefs and values are heavily influenced by existing social, cultural, economic, and environmental conditions, while in the long-term these conditions are in turn influenced by human behavior. These continuous interactions underlie the dynamic nature of human beliefs and values, as well as the surrounding social, cultural, economic, and environmental conditions. The increasing support for and dedication to sustainable forest management (SFM) reflects an evolution in the human value system, which in turn reflects the social, cultural, economic, and environmental conditions of the late twentieth and early twenty-first century, conditions which are quite different from those of the nineteenth and early twentieth century. The economic principles, theory, and models of SFM need to reflect the realities of the twenty-first century.

The concept of SFM incorporates human preferences for timber and non-timber products, preferences for marketed as well as non-marketed products and services, the preferences of industrial as well non-industrial agents, including Aboriginal and other local people, and the preferences of future generations as well as the present one. It takes account of diversity of preferences across agents, communities, time, and generations, and incorporates preferences that are revealed through the market as well as through non-market mechanisms. Forests, in the context of SFM, are valuable for their contributions to ecosystem functioning as well as their physical outputs. However, the existing paradigm of forest economics, which is focused on sustained yield timber management and has its roots in the conventional neoclassical paradigm of economics, is based on the combination of utility maximizing rational agents and the 'invisible hand' leading to an efficient general equilibrium. In this framework, peoples' preferences are internally consistent, static and revealed through the market only; public inputs are selected on the basis of market signals; all systems, including ecosystems, can be commoditized, which converts them into functionally-disjointed and discrete units; and there are no commitments and moral judgments attached to the domains of forest values. It is evident that the basic premises of the existing paradigm of forest economics are in serious contradiction of the realities and expectations of SFM, and the economics of SFM will thus require an extension of the boundaries of forest economics.

Keeping the unique features of SFM and the need to extend the boundaries of forest economics in perspective, Shashi Kant published, "Extending the boundaries of forest economics" in Volume 5 (2003) of Forest Policy and Economics. Response to the publication of this article revealed that there were many other forest and resource economists who shared our vision of extending the boundaries of forest economics. We then planned an International Conference on the Economics of Sustainable Management, at the University of Toronto, on May 22-24, 2003, but due to the outbreak of Severe Acute Respiratory Syndrome (SARS) in Toronto, the conference had to be rescheduled to May 20-22, 2004. In fact, the SARS outbreak was a good example and a reminder to economists of natural uncertainties.

We are pleased to announce that this volume is the second of the new series "Sustainability, Economics and Natural Resources". The papers in this volume and its companion "Economics, Sustainability, and Natural Resources: Economics of

Sustainable Forest Management" were originally presented at the conference. (In addition, a special edition of Forest Policy and Economics, Volume 6, Issues 3-4, also includes papers from the conference.) The volume is not a mere re-printing of conference papers, however. The original selection of papers and the rewriting, and reworking of them after the conference have been designed to cover the institutional issues related to SFM in an integrated and reasonably comprehensive way. We are thankful to the authors for responding positively to our suggestions.

In this volume leading institutional economists discuss appropriate institutions for sustainable forest management, markets for environmental services, deforestation and specialization, and some country experiences related to institutions for carbon emissions and sequestration (Kyoto Protocol), international trade, biodiversity conservation, and sustainable forest management in general. The companion volume mentioned above focuses on selected key aspects of the economics of SFM, including complexity, ethical issues, consumer choice theory, intergenerational equity, non-convexities, and multiple equilibria.

The conference was organised by the Faculty of Forestry, University of Toronto in collaboration with the Groups 4.04.02 and 4.13.00 of the International Union of Forestry Research Organizations (IUFRO). We are thankful to the late Prof. Maurizio Merlo and to Prof. Hans A. Joebstl, Group Leaders of IUFRO Groups, for their support.

The conference was made possible through the financial and overall support of the Canadian Forest Service, Ford Foundation, Forest Products Association of Canada, International Paper, Living Legacy Trust, Ontario Ministry of Natural Resources, Sustainable Forest Management Network, and Weyerhaeuser Canada. Along with our thanks to these organisations we would like to specifically recognize the contributions of – Gordon Miller, Jeffrey Campbell, Michael L. Willick, Paul K. Perkins, Sharon G. Haines, Karan Aquino, and Mark Hubert – who supported us throughout the period of about two years. We also express our thanks to Prof. Robert J. Birgeneau, Ex-President, University of Toronto, Prof. Rorke Bryan, Dean, Faculty of Forestry, University of Toronto, and Brian Emmett, Assistant Deputy Minister, Canadian Forest Service for their support and participation in the conference.

Special thanks are due to Amalia Veneziano and Sushil Kumar who were instrumental in the organization of the conference, with the assistance of other students and staff members of the faculty.

Finally, we would like to thank Springer Publishers and their staff members, specifically Paul Ross, Henny Hoogervorst, and Esther Verdries for taking up this project and Sushil Kumar who did a great job turning the manuscript into camera ready copy.

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CHAPTER 1

SUSTAINABILITY, INSTITUTIONS, AND FOREST MANAGEMENT

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Abstract. This chapter provides an overview of the contents of this volume. To put the contents in perspective, first the developments related to the concept of sustainable development and sustainable forest management (SFM), institutions, institutional economics, and their importance to SFM are discussed. Next, the relevance of markets and other institutions to sustainable forest management is discussed. Finally, an overview of each chapter included in the five parts of this volume is provided.

1. INTRODUCTION

The word "sustainable" is not new to the forestry profession, including forest economists, but the dynamics of societal values, specifically those related to forest resources and environment, have added new dimensions to thinking about sustainability of forest resources and forest management. The recent concerns about sustainability, signaled by the publication of 'The Limits to Growth' by Meadows et al. (1972) and 'Our Common Future' by WECD (1987), are not limited to a specific product or resource but include all natural systems and human life. The roots of the concept of sustainable forest management (SFM) can be found in these two publications, but it derived impetus from several global events, including the 1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, the Intergovernmental Panel on Forests (1995-97), the Intergovernmental Forum on Forests (1997-2000), the United Nations Forum on Forests that came into existence in 2001, and the Johannesburg Summit in 2002. In

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terms of human activities and outcomes, concerns with global warming, declining energy sources, environmental pollution, biodiversity loss, and deforestation and degradation of forest resources raised global concerns about the sustainability of natural and human systems. The role of forest resources and sustainable forest management in sustainable development (or sustainability of society) can be gauged from the fact that forest resources are a critical component of most of the sustainability related international agreements, such as the Biodiversity Convention, the Kyoto Protocol, and the Agenda 21.

The parameters of SFM, after the Rio Summit, gained further clarification through the criteria and indicators initiatives such as the Montreal Process and the Helsinki Process, as well as through various forest certification schemes. In general, SFM refers to the ways and processes of managing forest resources to meet society's varied (social, economic, and ecological) needs, today and tomorrow, without compromising the ecological capacity and the renewal potential of the forest resource base. In economic terms, the main distinguishing features of SFM are the recognition of diverse and dynamic preferences of local people and other stakeholders, the incorporation of multiple sources of value and utility from the forests (including non-market values), the incorporation of multiple products and services in the production process, public participation in management decisions through non-market mechanisms, inter-generational equity, and a systems approach to forest management. Hence, SFM involves a complex matrix of interactions between social, economic and natural systems, and the resulting outcomes. In short, the transformation of forest management from sustained yield timber management (SYTM) to sustainable forest management is equivalent to the change in natural resource management from a "reductionist-mechanistic" or Newtonian approach to a "holistic-evolutionary" or Post-Newtonian approach. .

In the context of the global recognition of the concept of sustainability and the global goal of sustainable development, the challenge to the current and future generations of economists is to build a new economic paradigm—based on a more organic, holistic, and integrative approach than the reductionist neo-classical paradigm. The concept of sustainability offers a challenge to economists to bring the profession closer to the real world. As Einstein once observed, problems cannot be solved at the same level of thinking that lead to their creation (Ikerd 1997). Hence, the economic theory of sustainability and the economics of sustainable forest management cannot be based on the reductionist approach of neo-classical economics that has contributed to many problems related to sustainability[1], and a new economic theory, rather than a new public policy based on old theory, will be needed to guide humanity toward sustainability or sustainable development.

In the companion to this volume—Economics, Sustainability, and Natural Resources: Economics of Sustainable Forest Management—leading economists from behavioral economics, complexity theory, forest resource economics, post-Keynesian economics, and social choice theory discuss selected specific aspects of the economics of SFM, such as complexity of economic systems, ethical issues, consumer choice theory, intergenerational equity, non-convexities, and multiple equilibria. Institutional aspects are, broadly speaking, another critical dimension of sustainability and SFM; some scholars, such as Spangenberg (2002), identify

institutions as a fourth dimension of sustainability, along with the social, economic, and environmental sides, while others, such as Opschoor and van der Straaten (1993), have used an institutional approach to suggest a new non-neoclassical economic framework for sustainable development. In fact, such institutional economists as Veblen, Kapp, and Myrdal, now thought of as members of the "old institutional economics"[2] stream, have been among the strongest critics of neo-classical economic theory. This volume focuses on institutions, institutional economics and sustainable forest management.

Institutional economists have found the classificatory distinctions between economic and non-economic factors and between economic and social processes to be unacceptable (Kapp, 1976). For them economics is much more than the study of a particular form of behavior—that of the "rational" economic agent—and of the determination of general equilibria, as is evident from the definition of economics provided by Gruchy:

> Economics is concerned with "the study of structure and functioning of the evolving field of human relations which is concerned with the provision of material goods and services for the satisfaction of human wants […] it is the study of the changing patterns of cultural relations which deals with the creation and disposal of scarce material goods and services by individuals and groups." (Gruchy, 1947, pp. 550-552)

The key differences between neoclassical economics and institutional economics can be summarized in the words of Söderbaum:

> "Thus the neoclassical economist tends to believe in very clear boundaries between economics and other disciplines and in the possibility of giving useful advice on the basis of highly specialized knowledge …. Institutional economists on the other hand emphasize a holistic or inclusionist (as opposed to exclusionist) approach to economics and policymaking. Specialization and division of labour is seen not only as a positive possibility, but also as a danger.. .. Equilibrium theory has been mentioned as an example of the mechanistic tendencies of neoclassical economics. Institutional economists in turn have a preference for evolutionary thinking. "Patterns modelling" (Wilber & Harrison, 1978) is a characterisation of this interest in how technology, institutions, habits, values and the economy at large evolve through time (cf. also Norgaard, 1985). Where neoclassical economists use models that are closed in a mathematical sense, institutionalists prefer models which in the same sense are open-ended or only partially closed (Myrdal, 1978). (Söderbaum, 1992, pp.131-132)

The main problem of neo-classical economics, at least with respect to sustainability, is the common aphorism "economists know the price of everything and the value of nothing"[3], and the direct evidence of this claim is the exclusion of non-priced natural resources, including environment benefits, from neo-classical production analysis. However, as mentioned earlier, sustainable forest management and sustainable development involve not only priced goods and services but also values far beyond the reach of market mechanisms. In such circumstances, the neoclassical weighing premise, based on prices, has to be replaced by a hierarchical approach based on values. In this hierarchy, there may be some ultimate values, ones which cannot be substituted and which therefore can neither be protected nor managed through market mechanisms; management decisions around such values should not be based on an aggregation of individual preferences for them. The starting point for sustainable forest management (and sustainability) has to be the

value society places on forest (and all other natural) resources. In this context, markets and market prices can constitute one of the many institutional arrangements to support and strengthen a broader set of institutions for sustainable forest management. Hence, though the discussion of the institutional aspects of sustainable forest management has to go well beyond markets and prices, it does include them.

This volume's authors articulate many of the institutional aspects of SFM. This introductory chapter provides an overview of the contents, after a brief discussion of markets, institutions and sustainable forest management designed to provide some perspective.

2. SUSTAINABLE FOREST MANAGEMENT, MARKETS, AND INSTITUTIONS

Sustainable forest management, just as sustainability, must be defined in its broadest sense. People will always disagree as to exactly how much should be preserved for future generations, about the legacy of resources, technologies, and aesthetics each generation should leave for the next. But, broadly speaking, the idea of sustainability implies that the legacy passed on should be adequate or acceptable. Most people would accept that decisions bearing on the future will often involve tradeoffs. Saving some species may have high costs in terms of foregone human consumption; saving some may come at the expense of saving others, but most people would also want to avoid a future world without forests, clean air or water, irrespective of the cost this might impose on the present generation. One of the tasks of the physical and social sciences, especially of economics, is to distinguish the items/values which are beyond trade-offs —ultimate value or "merit-goods" (James, Janesn, & Opschoor, 1978; Hueting, 1980)—and to clarify the terms of trade-offs among the goods which can be substituted for each other. In this task "merit goods" are beyond the boundaries of markets, and other institutions must play the key role in the decisions involving these goods or attributes of natural resources. Among those goods which are substitutable, some may not be subject to market transactions, due to the non-existence of markets for them[4], in which case their valuation and hence decisions regarding their tradeoffs with marketable goods and services will also require the support of some other institutions. Markets are useful in establishing appropriate rates of trade-off among the goods, those which can be effectively traded in the market. Hence, it is important to have an understanding of how the relevant markets function and what instruments governments can bring to bear to make them work better.

Markets are a social construct and operate in the context of a set of institutions, which greatly affect how well the market mechanisms serve human needs. To work well, markets must be well designed; they do not simply and automatically appear in their optimal form. As has been commonly noted, although perfectly competitive markets can often be shown to be the most socially efficient variant, most of the participants in such markets would prefer a different variant, one in which they have some monopoly or monopsony power, and will when possible bend their efforts towards the achievement of that socially inferior variant. Adam Smith's "invisible

hand" which directs the functioning of markets towards a good social outcome may be invisible when working well, but is by no means automatically present and is usually under attack from very visible hands. The role of the state and the institutions it supports or constrains is thus important to good market functioning.

Institutions and policies interact with markets in at least three important ways. ”Good markets", in the sense of ones which are socially beneficial sometimes owe part of their effectiveness to conscious design, always owe some of it to surrounding social institutions[5], and often require regulation to prevent some form of malfunction (such as abuse of monopoly power). Thus there is limited meaning to the frequently discussed question of how well markets work, since the answer must by definition be couched in terms of what the surrounding institutional framework is like, how effective government regulation is, and so on. This is not to imply that comparison of markets vs. governments as resource allocators has no meaning, since markets can have a greater or smaller role in the process; but it does imply that in its simplest form (which disassociates markets from the surrounding institutions) the question is indeed meaningless.

Discussion of the role of markets in any resource allocation process, including those surrounding forests, can be conveniently divided into two parts. First, what sort of institutions, regulations and support from public policy can in principle raise the performance of markets in doing what they can do relatively well? Second, in what respects or circumstances can markets not be expected, even under the best of circumstances, to work well in the sense of promoting social welfare. Public policy in the first area is designed to make markets work better, in the sense of helping them to achieve the best that can be expected of them. For example, a set of regulatory actions may assure that a given market approximates the ideal of pure competition, by blocking actions which would make entry more expensive. In the second area policy is designed to replace, completely or partially the function of the market as resource allocator. For example, it is recognized that markets cannot be relied on for decisions on the level of output of public goods or for the allocation of “merit-goods”. The dividing line between these two types of state involvement is somewhat fuzzy. In any case, the role of the state and other social institutions is critical in both the situations.

What is the nature of the choices that need to be made as to the optimal roles of markets and of governments or other resource-allocating devices in a country? In broad terms the alternatives involve any number of combinations of market roles or functions with government (or other collective) roles and functions. For allocation to occur effectively in a given domain, say that of agriculture, requires that whatever markets do perform allocative functions be adequately supported by informal or formal (often state) institutions. Thus a particular type of market, which only works well when provided with some specific type of support (say to avoid theft) will not work well unless that support is available. Broadly speaking, there are upper limits to how well both markets and collective action can contribute to the effective functioning of an economy. Where, say, the conditions which make markets work well are scarce (e.g. a high level of information by buyers as to what they are getting), the function which that market might in principle perform well were the information conditions satisfied may be better carried out directly through collective

action (government being a prominent form of this). Alternatively where effective collective action is very scare (because people do not trust each other or are excessively corrupt or rent-seeking) then those market-collective action partnerships which require effective collective action may be impossible or may be best left to relatively unsupported markets, even though these function poorly (everything being relative). As economic theory makes clear, markets supported only by weak institutions cannot be expected to come even close to constituting a perfect management system for an economy.

For each of the various challenges which people have in mind when they use the term "sustainable forest management" one may ask the question, "What combination of institutions, other than markets, (including prominently those of collective action) and markets may best respond to the challenge? A useful starting point is a list of the major challenges and of the combinations of institutions and markets which may be relevant to each of them. At least six major challenges are currently receiving priority attention: (i) global warming and the role of forest resources in that process; (ii) loss of biodiversity and the role of forest resources in that process; (iii) the recognition of Aboriginal and other local groups' rights on forests and incorporation of their values into forest management systems; (iv) the threat of an energy scarcity and the possible contribution of forests in addressing it; (v) possible scarcity of wood and other forest products for non-energy uses; and (vi) poverty and the extent to which forest use or misuse contributes to it, especially for the half billion or so people who derive considerable shares of their income from forest products.

How well various market and other institutions work cannot be summarized in any way which is both brief and satisfactory. One useful starting point, familiar to many students of economics, focuses on the conditions under which markets can achieve a sort of social optimum; this invites consideration of how those conditions can best be satisfied. The remaining weaknesses or incapabilities which exist even when the markets are functioning as well as can possibly be expected must be dealt with in some other way. Traditional Western economic theory focuses heavily on the merits of the perfectly competitive market, which allocates goods efficiently between suppliers and demanders (producers and users). For the "perfectly efficient" outcome which theory describes to come to pass requires (i) many buyers and sellers (to assure that the market is competitive enough, i.e. not subject to monopoly distortions); (ii) perfect knowledge and foresight on the part of all buyers and sellers; (iii) no externalities whose effects cannot be "marketized"; and (iv) no public goods (i.e. goods which are non-rival and non-exclusive). In simple textbook theory, the first limitation calls for regulation to prevent or control monopoly behavior; the second calls for regulations on accuracy in advertising and attempts by the state to improve the quality of information about goods and services sold in markets; the third calls for taxes or subsidies to offset the effects of such externalities; the fourth requires the state to make the allocative decision about such public goods since theory implies that markets cannot do so effectively, even if supported by the best institutions imaginable.

But even after responsibility for public goods is given to the state and the best supports, controls and regulations which real world governments can design and

implement to make markets work well are in place, several major weaknesses typically remain, creating difficult challenges and forcing difficult decisions.

2.1 Markets Support Resourceful and Powerful People

Markets which are efficient in the narrow neoclassical sense weight the welfare of each person in proportion to his/her purchasing power, and allocate goods and services to people roughly in accordance with their initial wealth. In any society in which initial assets are very unequally distributed, "perfectly functioning" markets will thus reproduce that inequality; the economic system will give 100 times more weight to the welfare of one person than to that of someone else with only 1/100th as much wealth. The morality of such a system is obviously open to question. In some societies the state undertakes considerable redistributive activity, while in others it does not. At the world level, where the richest decile of people has about 65 times as much purchasing power as the poorest decile (Berry & Serieux, 2004), only a minuscule amount of redistribution in favour of the poor occurs. Both within countries and between them, the better off are able to use many instruments of power to maintain or even enhance their relative position. The institutions which surround markets and the governments which have the responsibility of making markets work well and fairly are all vulnerable to the self-serving tactics of the rich, from the use of legal systems in unfair ways to the use of informal pressure, the taking advantage of superior information, and finally the use of power to access valuable assets.

2.2 Human Preferences, Competition, and Jealousy

Human preferences may be such as to make human satisfaction difficult to achieve. Whether this is due to deep cultural characteristics or to the deliberate manipulation of economic agents for their own benefit, it can be problematic. Thus, when each individual in a society can be satisfied only by abusing others, demonstrating superiority to others or by other actions which involve "zero-sum games", then the task of making everyone happy becomes impossible. Businesses often promote jealousy ("keeping up with the Joneses") in order to increase their sales. State manipulation of preferences is a tricky ethical subject, but all states inevitably engage in such activities up to a point (if only in trying to dissuade people from the view that it is appropriate to abuse others in certain ways). How far the state or the collective should go in discouraging preference creation which has a zero or negative sum feature to it is an important social question.

2.3 Market Power as a Source of Economic Inefficiency and Inequality

Market power remains an important source of both economic inefficiency and inequality in nearly all countries of the world. It is often commingled with political and social power related to income and wealth inequality. It often takes the form of

large enterprises, owned by wealthy people, taking unfair advantage of smaller firms owned and operated by lower-income people.

2.4 Incomplete and Asymmetric Information as a Source of Inefficiency and a Limitation to Sustainability

Incomplete and asymmetrical information contributes to market inefficiency even in the absence of inequalities of wealth and political and social power; in the presence of those patterns its impact is the more perverse. One prominent sort of inefficiency occurs as businesses try to mislead potential buyers with respect to the qualities of their products.

Incomplete information, especially about the future, leads to dynamically unstable and unpredictable paths of economies. Instability and the related path dependency detracts from the capacity of economies to achieve optimal outcomes at each point in time, and calls for state action to stabilize, to steer the economy towards superior equilibria and away from inferior ones. Even when markets are relatively adequate in allocating resources effectively at a point of time, or over a short period of time, they are generally much less efficient in allocation across long periods of time. The particular inefficiency of futures markets constitutes a limitation to conservation and sustainability, both in general and in the forest domain. Disagreements on how future and present values should be compared show up in debates on the appropriate discount rate which should be applied to future production, a matter of special importance in the context of forestry, where the growing period is long.

The papers included in this volume discuss important aspects of the institutional dimension of SFM. The volume starts with various theoretical perspectives on institutions for sustainable forest management and closes with the integration of the thirteen chapters by highlighting the linkages between institutions and the basic principles of the economics of SFM. In between, three other major themes—markets and SFM, deforestation, specialization and SFM, and country-specific institutional experiences—appear in the volume. .

3. THEORETICAL PERSPECTIVES ON INSTITUTIONS FOR SUSTAINABLE FOREST MANAGEMENT

Within the category of sustainable forest management issues, some are essentially technical ones and permit reasonably general answers which in turn allow one to proceed to a consideration of the sort of institutions best able to implement a clearly identifiable strategy. Others are not technical in the same sense, and thus have no general answer identifiable in technical terms; where, for example, societal values matter, some institutions will tend to produce "better" decisions than others. It is thus important to think about appropriate institutional design, appropriate decision-making systems and the like. What such institutions may be and how well any of them are likely to function depends on the level of knowledge and understanding of

the role of forests vis a vis the challenges noted above. In this section, four chapters examine the theoretical aspects of institutions for SFM.

In Chapter 2, Luckert focuses on difficulties associated with the definitions and descriptions of institutions and the complexities of linkages/interactions between institutions and behavior of economic agents, and highlights the difficulties in identifying or even defining optimal institutions for SFM. He argues that due to these complexities it is very difficult to pin down the links between institutions and economic processes, and it further complicates the understanding of such links as do the sometimes ambiguous social objectives of SFM. He argues that even if we stick to the simplistic version of institutions which focuses only on the rules related to property rights, the combination of rules and situations covers a dauntingly wide range. The author emphasizes that more effective linking of institutions to economic behavior in pursuit of social objectives will require: (i) refinements in the understanding and characterization of institutions; (ii) refinements in the understanding of non-institutional determinants of behavior (such as socio-economic characteristics of firms and their time and risk preferences); (iii) a wider recognition of potential co-dependence (as opposed to cause and effect relationships) between institutions and economic behavior; (iv) more explicit recognition of transactions costs and belief systems; and (v) clearer specifications about what we want sustainable forest management to achieve.

Luckert concludes that although the tradition of theoretical abstraction and mathematical expression has contributed to our understanding of the impact of incentives and institutions on behavior and outcomes, we need to weigh the benefits and costs of such reductionism. He argues for a cross-disciplinary approach and more holistic thinking, and warns economists that without this balance their analysis may give answers which are precisely wrong, or precisely irrelevant. Readers will find many similarities between Luckert's arguments about complexity, the need for a cross-disciplinary approach, and holistic thinking and the chapters by Colander (2005), Kant (2005), and Khan (2005) in the companion volume—Kant and Berry (2005).

In Chapter 3, Diaw elaborates on the complexity of institutions and the weaknesses of the neo-classical or Western view that the optimal tenure system everywhere will be built around individual rights (though of course such a system applies much less to forest land than to agricultural and urban land even in Western countries). Diaw argues that customary tenure (mingled with state law and occasional private titling) continues to predominate on African rural and forest lands, in spite of prediction of its demise by evolutionist theories and the destructive attempts by colonial and post-colonial policies. He develops an anthropological conceptualization of embedded tenures, with examples from Africa and various parts of the world, and highlights the factors that account for the flexibility, adaptability and resilience of this type of institutional (tenure) system. He argues that embedded tenure has been able to cope with economic stress and hostile policies because of the unique way in which it nests private entitlements into the commons, and into collective property and long-lasting social institutions.

Diaw emphasises that the reductionist economic (neo-classical) interpretation of non-market systems, including kinship, common property and non-wage systems,

have contributed to a dismissive attitude towards customary tenure systems, which tend to be complex and embedded in other social institutions, and to relegate their most innovative aspects to the limbo of "imperfect markets." He also highlights the failure of the Common Property Regime (CPR) literature, which focuses on the crafting of institutions, to duly recognize the theoretical and policy implications of the nesting of appropriation regimes in embedded tenure systems. The author enumerates the policy mistakes that can derive from such reductionism and concludes that, to rescue African forest policies from the mistakes (with attendant social costs) of the past, it is necessary to take due account of the complexity and validity of embedded tenure institutions and their demonstrated ability to adapt to legal pluralism and commodity markets.

In Chapter 4, Kant and Berry extend the arguments of the Luckert and Diaw into the area of institutional dynamics, arguing that neither the distinction between private and state regimes nor the price-dependent dynamics of institutions can adequately explain institutional dynamics. They also argue that organizational factors, along with institutional factors, play an important role in how institutions evolve. They propose a framework for institutional analysis which takes account both of factors internal to the institutions and organizations and of the external setting − the social, environmental, economic (including markets) and international factors, and suggest adaptive efficiency as a more helpful indicator than allocative efficiency in the analysis of institutional changes that are path-dependent rather than simply price or market-dependent.

The authors apply this framework to analyse the evolution of Indian forest regimes, finding that institutional evolution have been incremental and path-dependent, with the exception of the sudden shift from the dominance of community regimes in the pre-British period to that of state regimes in the British period. The dominant causal factors in this pattern of incremental change have varied markedly over time: institutional inertia of informal institutions in pre-colonial India; "organisational energy" during colonial period; self-reinforcing mechanisms at the level of the Legislative Wing and "organisational inertia" of the Executive Wing of the government during the first thirty years after independence, and "organisational energy" of the Legislative Wing, the external setting, and "organisational surges" of the Executive Wing during the recent periods. Prices and market factors were not the dominant determinants of change in Indian forest regimes. The authors conclude that the concept of property rights, as applied in neoclassical economics, is not sufficiently subtle to explain the success or failure of forest regimes, and that prescriptions for sustainable forest management should address institutional and organizational aspects in an integrative manner. This chapter contributes another dimension—organizations and organizational inertia—to the broad institutional story.

In the last chapter of this section, Chapter 5, Vatn extends the discussion to a specific category of institutions—value articulating institutions, and discusses a set of issues involving the evaluation of biodiversity in the context of forest ecosystems. He argues that choosing evaluative instruments implies choosing between different perceptions both of the good and of the (potential) rationalities involved.

Vatn argues that cost-benefit analysis, with its focus on monetary evaluation/contingent valuation, fails to treat the issues involved in a way consistent with the characteristics of the good and the ethical concerns involved, and makes a case for the use of deliberative value articulating institutions for the valuation of biodiversity. He accepts that there are important differences across the range of deliberative institutions, but emphasizes that these institutions generally offer a better response to the problems involved, such as cognitive limitations (where the potential for communication between citizens and experts is pivotal) and normative issues (the process by which we develop an understanding of the ethical issues and dilemmas involved). The author supports the view that these institutions offer possibilities for learning about and handling competing or incommensurable perspectives, and ways to handle issues where radical uncertainty is involved, by providing the necessary opportunity to resolve the relevant cognitive and normative issues in a reasoned way. He concludes that only deliberative value-articulating institutions can offer biodiversity valuation that is context-consistent with the type of cognitive and normative issues involved.

4. MARKETS AND SUSTAINABLE FOREST MANAGEMENT

The chapters of Section Two focus on markets related to environmental services, specifically the carbon sequestration of forest ecosystems. The common message of the section is that the creation of markets for environmental services is necessary but not sufficient for sustainable forest management. It thus reinforces the point made in section 2 of this chapter, that markets are only one category of institutions and cannot work efficiently in the absence of other supporting institutions.

The opening chapter by Binkley emphasizes the need for environmental services markets, and observes that much work remains to be done in designing the details of those markets. He identifies four main features of the forestry sector: the capital intensity of forest management; the material value of environmental services from forests; an increasing national and international emphasis on using markets to secure the material value of these services for the society; and finally, the possibility of capitalizing the value of environmental services into investment decisions. He observes that the evidence seems to be consistent with the first three of these, but, regrettably, not the fourth.

Binkley argues that the enthusiasm for markets for environmental services has so far not been matched by the reality. Economists, in espousing markets for environmental services, commonly focus on the misallocations associated with the absence of markets, but forget the transaction costs associated with the creation and effective functioning of markets. He identifies three kinds of transaction costs associated with markets for environmental services: political cost (associated with the negative reaction of the losers from environmental regulations), measurement cost (the cost of measuring environmental services), and actual financial transactions costs associated with the designing and developing market instruments such as licenses to deal in financial derivatives, and trading mechanisms for carbon credits. The author observes that in the face of the obvious problems and the clear economic

prescriptions for solving them, economists commonly imagine policy makers to be stupid or venal because they do not jump to adopt market-based mechanisms; in his experience though policy makers may be venal they are rarely stupid. The author concludes with a note of optimism for markets of environmental services citing as example the New South Wales Greenhouse Abatement Certificates (NSWGAC) system in Australia.

In Chapter 7, Chichilnisky adds a critical dimension—equity—to the markets for environmental services which are public goods. She argues that the origin of today's global environmental problems is a historic difference in property rights regimes between industrial and developing countries, the North and the South. In developing countries, ill-defined and weakly enforced property rights lead to the over-extraction of natural resources, and these resources are exported at low prices to the North that over-consumes them. The international market amplifies the tragedy of the weak property regimes, leading to inferior solutions for the world economy. However, in developing countries, the conversion of natural resources regimes from community or state property regimes to private property regimes faces formidable opposition due to heavy dependence of local and poor people on these resources. Chichilnisky argues that the weakness of property rights in *inputs* to production, such as timber and oil, could be compensated by assigning well defined and enforceable property rights to products or *outputs* such as environmental services (carbon sequestration or carbon emission).

The author identifies environmental services as privately produced public goods, and argues that the markets for these goods are naturally different from those for private goods. Market efficiency in the case of privately produced public goods requires an additional condition which alters fundamentally Coase's conclusion about initial property rights; this is the Lindahl, Bowen, and Samuelson condition whereby the marginal rate of transformation equals the sum of the marginal rates of substitution among the traders. This additional condition required for efficiency `over-determine.' the market equilibrium. Therefore while market solutions exist, they are not efficient in general. Distributing properly the initial rights to emit allows one to reach solutions that clear the markets and are, simultaneously, efficient in the use of the global public good. Hence, markets that trade public goods require a measure of equity to ensure efficiency, a requirement different than the markets for private goods. The author cites the 1997 Kyoto Protocol as an example.

5. DEFORESTATION, SPECIALIZATION AND SUSTAINABLE FOREST MANAGEMENT

The rapid deforestation occurring in many parts of the World has been a matter of widespread concern during the last few decades; the more gradual loss of world forest cover has worried some people for much longer. The felling of forests has been part of the development process everywhere. Population growth creates pressure to shift land from forests to agricultural use. Where development is successful this process eventually abates and reverses itself as population growth slows or disappears and land productivity in agriculture reduces the demand for land

for that purpose. By this logic, and given sufficient optimism that currently developing countries are following and will follow the path previously traversed by the now developed countries, one might presume that the pressure for deforestation would eventually cease. Pessimists express concern that many developing regions are still very far from the turning point at which that pressure begins to abate, that some may never reach it (witness Haiti) or—currently the bigger concern, that the turning point may coincide with far too little remaining forest for global needs on the climatic and biodiversity fronts. In fact, the main cause behind the evolution of the concept of sustainable forest management has been tropical deforestation. In this section, Hartwick and Hyde examine some economic aspects of deforestation, and Sedjo discusses the role of specialization in sustainable forest management.

In Chapter 8, Hartwick presents an interesting interpretation of the long-run mechanisms linking population and economic growth to deforestation. His conceptual framework provides the tools to analyse the interaction among population, forest use, and agricultural land. While noting the obvious (Malthusian) possibility that population growth may cause deforestation, he also highlights the possibility that deforestation may contribute to economic growth and thereby forestall the negative impact of population on subsistence. In the extreme, the felling of forests may provide the exports which buy the imports (e.g. machinery and equipment for industrialization) which accelerate growth, slow population pressure and eventually lead to afforestation as the need for agricultural land diminishes. The combination of being able to tap an existing store of wealth (the timber) and get access to land for agricultural production has been productive of economic growth in a number of historical cases. At the other end of the "growth-promotion" spectrum would be those cases in which the export of timber has simply produced revenues for a narrow elite which has transferred the funds to other countries and left land of little value for agriculture. Evidentially, the relationship between clearing of land, population, and economic growth can vary widely, and it is pivotal to make key distinctions according to the key mechanisms at work.

The author highlights the fact that, in a situation of geographic isolation and a small resource stock, deforestation may lead to crisis as forests shrink and livelihood is imperilled; under such conditions sustainable forestry may be possible, whereas population growth is not. The conditions most conducive to sustainability of population and forests in an Easter Island type of scenario are property rights, social order, and a not trivial cost of harvesting. In contrast to geographically isolated areas like Easter Island, nations in Europe and cities in China have benefited from trading networks and an extensive hinterland providing resources and migration possibilities.

Deforestation has abetted population growth for centuries. As for the effect of population on deforestation, increases in population mean an increased demand for food and fuel, but the demand for food and fuel is a function not only of market size (population) but of market value (per capita income). Many increases in deforestation associated with increased population are actually the result of independent causes that boost per capita income, changes such as improved weather conditions and improved technology. In sum, high consumption levels as well as high population growth rates threaten world forests.

One evidence of the damaging impact of population growth on forest resources would be a historical link between wood scarcity, timber prices and population. In the twentieth century up to 1950, timber prices actually declined while world population growth was at record high rates. Though timber prices did jump in the 1970's along with other primary resource prices, they have not displayed an overall upward trend since the 1950's. Hence, markets are not signaling a basic timber scarcity in spite of the aggressive deforestation of the past; this may be due to defects in markets, or perhaps dire scarcity of forests and forest products is a thing of the remote future. The best we can do is to think deeply and carefully about the past and its links to the present and future, and exhort prudence where aggressive timber harvesting practices continue.

In the second chapter of this section, Hyde reviews the lessons for sustainability from the observed pattern of forest development. He emphasizes that sustainability in its narrowest sense, a "permanent forest estate with unchanging boundaries," is a futile objective. A more reasonable approach is to first determine what to sustain—critical habitat, characteristics of global climate, perpetual options on the use of forest resources, or whatever—and then consider the feasible means for achieving each objective. In terms of either national or world goals for sustainable forest management, a considerable degree of flexibility must be maintained; often it is the total amount of forest that matters more than which pieces of land remain under forest. Thus an appropriate strategy from a world perspective involves "total or general conditions"—assuring enough forest to take care of carbon sequestration needs, biodiversity needs, etc., and also specific needs, related to the fact that certain forests are especially important for particular uses (e.g. if many poor people get livelihood from them), that for certain purposes forests cannot be sustained below a certain size, etc.

Hyde argues that sustainable forest management will not be achieved until we attain a higher state of general economic development than is common in substantial parts of the world today. Until the poorer countries do develop, the wealthier must provide necessary support, on a reliable long-term basis, to assist the institutions of the developing countries with the responsibility for managing their forest resources. Hyde's realistic assessment of SFM and its function puts an important and appropriate spotlight on overall economic development as the key ingredient in dealing with the current challenges related to forests and forest management and suggests several follow up questions.

In Chapter 10, Sedjo discusses the economics of specialization in the production of forest-based goods and services, its potential for increased productivity and lowered costs, and the associated intra regional and international trade. He notes that much of the modern environmental movement is opposed to such specialization and instead stresses the goal of individual forest sustainability in a spectrum of outputs, an approach which is the opposite of economic specialization. The author attempts to reconcile these conflicting approaches by emphasizing the substantial differences in the output mix generated by different forests.

Sedjo argues that forests have at least three distinct roles in contemporary society: to provide commodities such as wood; to provide a host of useful, indeed essential, local environmental goods and services such as watershed protection, and

to provide global environmental goods, e.g., biodiversity. He suggests that sustainable forest management requires not a single model, but rather at least three complementary models, if not more. The first model is drawn from the industrial revolution and modern agriculture and focuses predominantly on timber production. This is the intensely managed cropping system, where the other outputs of the forest are of minimal interest and the forest can be located in many places. The second model focuses on non-timber and non-market outputs, with the focus of providing ecosystem services, largely to a particular location. The third model relates to maintaining habitat that is conducive to the provision and continuity of biological diversity, largely native biodiversity. These models, at one level, may appear to be largely independent, but in a broad global context, they are highly complementary. Such a system would allow for specialization among the various components in order to generate a sustainable overall global forest system.

6. COUNTRY-SPECIFIC INSTITUTIONAL EXPERIENCES

In this section of the volume, authors evaluate the different institutional interventions undertaken in a variety of developed and developing countries. In the first three chapters, the focus is on the international regimes/institutions of Canada and the United States while the fourth chapter focuses on national and local level institutions in India, Indonesia, Malaysia, and Papua New Guinea.

In Chapter 11 van Kooten and Eagle discuss the Kyoto Protocol, the role of forests in meeting the Kyoto targets of carbon emission reduction, and the economics of carbon sequestration through afforestation, reforestation, and other forest management activities, specifically in Canada. They first review the main relevant features of the Kyoto Protocol—carbon sinks in lieu of CO_2 emission reductions, the potential carbon sinks allowed in forestry, and the discounting of physical carbon and its impacts on estimates of the costs of carbon sequestration. They then investigate the costs and limitations of creating carbon credits in forest ecosystems through land use, land use change, and forestry (LULUCF) activities. Their conclusion is that while potentially a significant proportion of required CO_2 emission reductions could be addressed using carbon sinks, once the opportunity cost of land and the ephemeral nature of sinks are taken into account, the cost of such carbon uptake is likely to be substantial. Carbon uptake via forest activities varies substantially depending on location (tropical, Great Plains, etc.), activity (forest conservation, tree planting, management, etc.), and the assumptions and methods upon which the cost estimates are based. Once one eliminates forestry projects that should be pursued because of their biodiversity and other non-market benefits, or because of their commercial profitability, there remain few projects that can be justified purely on the grounds that they provide carbon uptake benefits.

Further, the authors note landowners' tend to show reticence to tree planting programs, which will increase carbon uptake costs, and that trading of carbon credits and conversion of temporary into permanent removal of carbon will not emerge automatically. They acknowledge that there has been some trading of carbon credits but these have been limited to only large industrial emitters (LIEs) in a limited