

THE SCIENCE OF COMMUNITY FORESTS
PART II: THE SIMPLE THEORY OF FORESTS WITH JOINT PRODUCTS

INORD WORKING PAPER #4-08

DR. DAVID ROBINSON
DEPARTMENT OF ECONOMICS
LAURENTIAN UNIVERSITY

ABSTRACT. Community forests in principle provide an alternative to the existing tenure regime in Ontario's forests. The dominant model, has clearly failed in several important ways, but existing community forest experiments are, at best, very preliminary prototypes. Basic economic theory suggests, however, that a properly structured community forest regime would be superior to the existing regime. There can be no scientific test of the relative merits of the two systems because there are simply no community forests that can be rigorously compared to the mature corporate and administrative structures. In the absence of empirical evidence decisions will be made on political and theoretical grounds. This paper presents several reasons from standard economic theory that show why community forestry would be more productive than the current regime.

1. INTRODUCTION

1

2. INTRODUCTION

In *The Science of Community Forests PART I: Approaching Regime Change Systematically* we described a constitutional game that sets the rules under which the forest economy is managed. In that game the Minister of Natural Resources chose a tenure regime by comparing benefits under the alternative regimes. We suggested in that paper, following the welfarist convention in economic policy analysis, that the Minister might take into account all costs and benefits, monetary and otherwise, to the communities, the forest companies and to society at large,² and went on to describe how the regimes might be compared in principle.

¹Research for this paper was supported by the Northeast Superior Mayor's Group and The Wildlands League of Ontario. The paper was originally prepared for the 40th Annual symposium of the Forestry Student Association at Lakehead University. Opinions expressed are those of the author and the supporting organizations have not been consulted about facts, conclusions or recommendations.

²We recognized the possibility that purely political consideration might enter the calculation.

The problem the Minister would face is the data is not available to calculate benefits. The Canadian forest industry is virtually an institutional monoculture there is far to little historical data to make a data-based choice. We argued further that valid experiments are not possible: would any experiment have compared demonstrated that the prototype for the Blackberry could challenge Bell's established system? The Minister must compare a possible regime - a hypothetical world - with the world we know. How, then, can she make a responsible decision?.

When experience offers no guidance, decision makers rely, at least in part, on the systematic distillation and extension of experience known as theory. Theory, as it turns out provides a great deal of guidance in this case, and it is clear that the Minister will have to learn the economic theory needed to evaluate the alternatives. This paper presents a simple theoretical model that captures key features of the debate Ontario's tenure systems³. The analysis uses basic techniques from the economist's toolbox in entirely conventional ways. Even a simple application of what is known about how the economy works apparently leads to rejecting the current tenure system in favour of a community forestry regime.

As James Heckman, a leading econometrician points out, "Models are not empirical statements or descriptions of actual worlds. They are descriptions of hypothetical worlds obtained by varying - hypothetically - the factors determining outcomes" [?]. Models use what we know systematically in order to find out what that knowledge can tell us. To quote Heckman again, "Science is *based* (my emphasis) on counterfactuals and theoretical models." A science of community forests, therefore, begins by developing a theoretical model in which the counterfactuals of interest can be examined. It begins with the difficult task of specifying an imaginary world. It is at this point that the research community has largely failed to engage the forestry problem. There has been a remarkable unwillingness to imagine alternatives to the current regime. The ministry has no arrows in it quiver.

3. TWO OUT OF THREE

There are three major problems in assigning tenure that have not been solved in the existing system. These are the joint-production problem, the discounting problem and the community development problem. We will discuss the first and the last of these. Discounting remains one of the greatest unsolved problems in economics.

3.1. The joint production problem. The joint production problem is the most fundamental of the three. Even the simplest possible a forest, one with stands single age and species, produces many outputs. Mixed species, mixed age forests make the problem even more complex. While wood it easily the most important revenue generator in this conventional economy, the forest also supplies water storages and filtration, carbon sequestration

³This paper is an extension of INORD discussion Paper 07-01, The elementary Economics of Forest Tenure, D. Robinson, August 2007

services, canoe routes and owl habitat. Harvesters and mill owners do not earn revenue for the services of the forests in cleaning water or sequestering carbon, and as a result they will take these products into consideration only out of good will or because of regulation. Economists speak of joint production in cases like this. BaumgŁrtner, Faber and Schiller[?] argue that joint production of this sort is the structural cause behind modern-day environmental problems.

A model with only two goods can provide substantial insight into the problem of joint production. Figure ?? shows the possible combinations of wood and recreation for a hypothetical forest. The curve is commonly called a production possibilities frontier, and it shows the maximum quantity of wood for any given quantity of recreational services. Points below the curve are feasible but inefficient. We will refer to the curve as a Forest Possibilities Frontier (FPF). The generally negative slope of the FPF captures the notion that as we increase the amount of wood taken the recreational value of the forest will decline. The problem is to choose the right mix of these interconnected outputs. The right mix, of course depends on who you are.

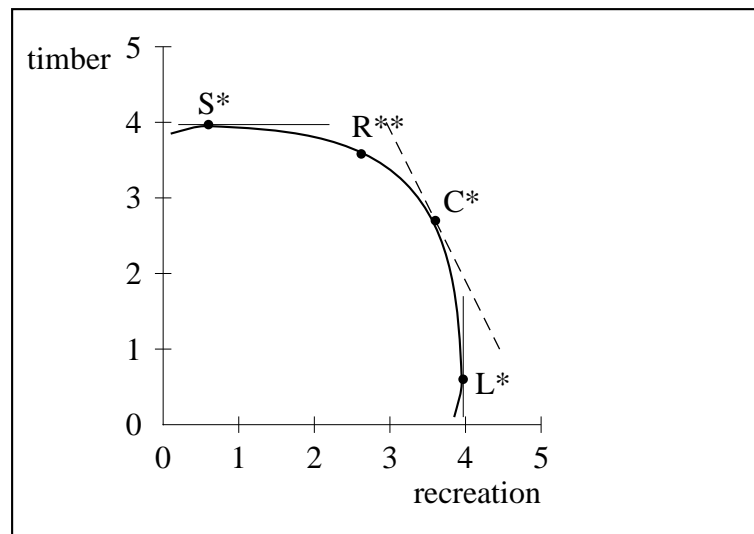


FIGURE 1. A multi-product, multi-interest forest

3.2. Human development. Developing human and community capacity is, if anything, the most fundamental goals of policy. Value-added is at bottom nothing but the value of the skill and effort added by producers. Developing a value-added forestry industry means adding more design and fabrication skill to wood. The two-good joint-production model provides some insight into the problem of human and social development one the implications of alternative tenure schemes are fitted into the figure.

The most preferred combinations from points of view of a shareholder and a lodge owner are labelled S^* and L^* respectively. The horizontal and vertical lines tangent to the FPC in Figure ?? are essentially the indifference curve from elementary economic theory. The shareholder is only interested in timber harvest, and the lodge owner is only interested in recreational services, so, given the power to choose each would pick the point on the FPC that gives them most of what they want. First-year textbooks don't, as a rule, introduce the possibility that there might be disagreement about the best combination to choose, but it is exactly that disagreement that makes the forestry problem interesting.

Sometime in the 17th century the Crown adopted a policy of allocating forest rights to harvesters in exchange for Crown revenue. At that point the forests were essentially uninhabited from the Crown's point of view. Only the timber values and the crown revenue mattered. The interests of the Crown and the timber companies were well aligned because both parties desired to be as far to the top of the graph as possible. If a market for recreational services emerged the Crown would prefer to shift production the point on the curve that maximized the sum of the revenues from both markets. If for example recreational services from a hectare were selling for twice the price that timber was selling for, the Crown would choose C^* .

There is a good deal of confusion about the term values, some of which Figure ?? can help to clarify. The three straight lines represent different values for the forest. In each case prices from outside of the system generate a value for the forest. For the stockholders the forest is worth 4 of whatever unit timber is valued in. For the lodge owner it is worth four of whatever unit recreational services are valued in. The Crown can realize values in two markets and transfer value between them. For the crown, with the relative prices used in the example the forest has a value equivalent to five units of recreational services or 10 units of timber.

Where do these values really come from? - from the wants of individuals who can pay for wood or recreational services. Obviously the bears and the squirrels are left out of the market, but individuals or governments can bid up prices on their behalf. The important point, however, is that the economic values for different players are filtered through the rights they have. The stockholders only value the timber in this case because they have the right to harvest only timber.

If the owner of the lodge owned the forest company, she would choose a point closer to C^* than either the forestry company or a simple lodge owner would. This is the main argument for privatising forests - a private owner with the right to exploit every aspect of the forest might take all of the values into account.

Although in principle lodge owner and shareholder might be the same person and might want exactly the mix that is best for society at large, such a fortunate coincidence of wants is unlikely. Society therefore relies on discussion and non-market mechanisms to

determine what we do. Government has a role, and in many cases we require government to decide how much wood should be taken. The government might require the forester to operate at R^{**} , for example.

Simple as it is, the example captures many of the relevant economic features of the forest tenure problem. It is clear that neither the lodge owner nor the forestry company should be entrusted with the entire forest. It might work to hand the entire forest, including the rights to the lodge, over to the forestry company. Then the company would be like the lodge-owner/shareholder. This solution is essentially the same as privatizing the forest entirely, and it is the solution that many economists might suggest.

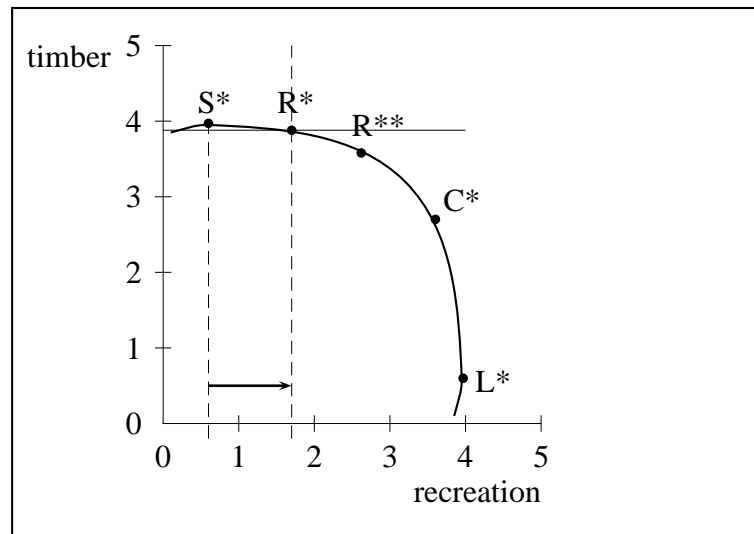


FIGURE 2. regulation

The unrestricted interest of the forestry company would lead it to choose S^* , but its behaviour may be moderated by political concerns. At a small cost, represented by a small downward shift of the horizontal line, the company can move a considerable distance horizontally to R^* , providing a considerable gain to the recreation operator. A small concession like this demonstrates good corporate citizenship and often yields significant political capital. Because the curve Figure 3 exhibits what economists call a diminishing marginal rate of substitution, moving from R^* to R^{**} costs the company much more but provides a smaller benefit to the recreation operator. The company will naturally offer smaller and smaller concessions when pressed because concessions are increasingly expensive in terms of profits.

The government might choose to regulate logging. In this case the government represents the interests of both the company and the lodge owner, hands control to one side, and

then tries to manipulate the behaviour of the agent with tenure. Regulation could set a performance minimum for example, by insisting that the company never let the recreational potential fall below R in Figure 3. Government would expect the company to choose R^* , which is better than S^* but not as good as R^{**} . Regulation imposes compliance costs on firms, and generally calls for monitoring and enforcement expenditures by government. In practice the company would often choose R^{**} and argue that it had in fact complied with the regulation. Shading compliance in this way is to be expected because there is often a great deal of money at stake. If the government chose to dispute the issue there would be additional legal costs. In general, if the public wants a small deviation from profit-making behaviour, the cost of regulation is small, but large adjustments can be very costly.

A third alternative might be to hand control of the forest over to the local community, which would include people who depend on logging as well as people who depend on tourism. This is the community forest approach. It solves the problem by creating a corporate decision-maker that includes the interests of all the parties, as in Figure ??, and whose interests roughly correspond to the public interests. The resulting decision would again fall somewhere near C^* . Furthermore, the interests of the community are served very nearly as well by any point near C^* , as shown by the grey band in Figure 4. Simple economic theory indicates that community run forests would select the general public interest better than either forest run by the companies or a forest managed by the Ministry of Natural Resources. Unlike regulation the community based solution automatically comes near the social optimum and is difficult to move away from that solution.

Lukert (1999) has questioned whether the interests of communities are sufficiently aligned with those of the general public for community forestry to result in good management decisions. Are the interests of the public not adequately or even better represented by Queens Park operating through the Ministry of Natural Resources? The question deserves careful consideration. The interests of a local community are in general more nearly aligned with the general public interest in community sustainability, environmental preservation and economic development, than is the interest of a forestry company. To say that the interests of the community are more nearly aligned with those of the general public is to say that the public would prefer a solution near C^* in Figure 3.

Arguments that led the provincial government to decentralizing the forest management plans also lead to local, public tenure-holding.

The need for this local and public decision maker is already recognized in principle the province has created the Local Citizens Committees and is now working on what it calls cooperative SFLs. The LCCs are internal advisory bodies, and membership is screened by district managers, so they fall far short of public power, but they can serve to bring together the interests of most stakeholders. LCCs operate by consensus, and therefore cannot be expected to shift management decisions appreciably from those preferred by the tenure holders.

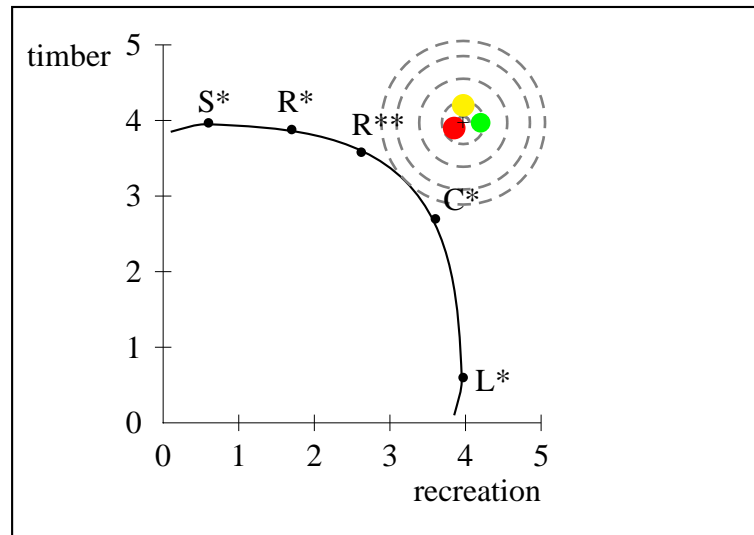


FIGURE 3. A community forest

Certainly community decision making will involve costs and conflict. It will be necessary to invest time and money in providing information, recording decisions, and facilitating public meetings. Two considerations are relevant. First, community decision making and participation will make new resources available for forest management - time and intelligence that is not available in the current system or that is used in oppositional ways. These resources are not costless in the broadest sense, but society is likely to be better off if they are directed toward solving communal problems. Second, and this is extremely important, energy and time spent managing communal forests will produce social capital: it is not simply a cost. The management of community forests will develop more people with management skills and knowledge that can be used to promote the community. Community forestry itself is a form of joint production, with social capital the invisible and potentially undervalued second product.

Fundamentally it is people that produce wealth. The most important investment a government can make is in people. This view is understood when we talk about the public education system. Universities increasingly see co-op programs that give students practical experience as an effective way to create capacity. Traditional apprenticeships relied on on-the-job-training. Management recruiters look for students with experience in the non-profit sector and in promoting community projects. It is obvious that community forests would create valuable management capacity, which would increase wealth-creation capacity.

More important, perhaps, is that the interests of multinational corporations increasingly diverge from those of both the community and the general public. Cabbage, Harou and

Sills (2007) point out that we face a systematic shift in the demand for environmental services.

This rapid expansion in the uses of forests as countries develop, combined with the expanded definitions of forest values, forces us to re-think forest policies to achieve these broader social goals. Some traditional forest policies may help us achieve production and protection of a broader set of forest goods and services. However, it seems unlikely that a set of forest policy tools originally designed to achieve production goals will be equally well suited for broader conservation, amenity and social goals.

A final question raised by Lukert (1999) deserves attention. Why bother maintaining forestry communities that developed to serve an industrial mode that no longer needs them? The answer is not that the communities in some sense deserve special exemption from the forces of the market. A sentimental concern for a dying way of life may be a poor guide to forest policy. The argument rests on the value of these communities to the rest of society. If, as seems likely, climate change, carbon sequestration programs and rising wood values call for more intensive silviculture, the people in these communities will be needed. Furthermore, if the tenure system is reformed to encourage the development of value-added forestry - both pre-and post-harvest - then these communities will be the basis of wealth creation to the benefit of the larger society. The interests of the forest communities in Northern Ontario are already intrinsically aligned, not with current social policy, but with a more ambitious and forward-looking forestry policy for Ontario. They just need the social policy to catch up

Experts believe that adding value to wood is the only possible direction for increasing employment and wealth in Northwestern Ontario's forest-based industry '[?]. Provincial policy actually discourages the development of value-added industry according to a report on encouraging investment in Northern Ontario: A value added wood strategy to promote the attraction and development of this sector in Northern Ontario is made difficult due to the fibre control policies of the Ministry of Natural Resources and the anticipated fibre supply which is expected to peak in 5-7 years. As result, many existing businesses have to source their supply from other parts of Canada Manitoba, B.C. and Quebec. Any new initiatives will face almost insurmountable difficulties in securing fibre or fibre approvals. [?]

In essence we have a classic case of regulatory capture[?], in which a regulator intended to act in the public interest comes to be dominated by the vested interests of the existing incumbents in the industry that it oversees. The classic source is Stigler, who argued that every industry or occupation that has enough political power to utilize the state will seek to control entry. In addition, the regulatory policy will often be so fashioned as to retard the rate of growth of new firms

In Part I we proposed that the Minister consider the following hypotheses to determine whether a shift to community forestry would result in a social gain. The

at *Compared to a community forestry tenure system, the existing industrial forestry model will:*

- (1) *produce more wealth* (wealth hypothesis)
- (2) *produce more jobs* (employment hypothesis)
- (3) *produce most value-added* (value-added hypothesis)
- (4) *produce more research* (research hypothesis)
- (5) *produce more carbon sequestration* (climate hypothesis)
- (6) *support most people* (population hypothesis)
- (7) *result in more secondary and tertiary economic development* (development hypothesis)
- (8) *create more attractive and livable communities*(community development hypothesis)
- (9) *result in more human capital* (human development hypothesis)
- (10) *result in more forest diversity* (ecological hypothesis)

The analysis above leads us to reject most of the hypotheses on purely logical grounds. the wealth, employment, value added, population, development, community development, and human development hypotheses.

The existing tenure system, descended as it is directly from the colonial relations of the 17th century, works strongly against human development in the communities of Northern Ontario. Not only does it tend to place resource decisions in the hands of non-residents, but by restricting access to the wood supply it obstructs the development of local businesses, inhibits entrepreneurship and innovation and prevents social diversification (*Prima face* argument that Hypotheses 2, 3, 6, 7, and 9 from *The Science of Community Forestry Part I* are incorrect). By inhibiting social development and preventing economic diversification the tenure system produces communities that are too small to provide amenities (*Prima face* argument that Hypothesis 8 is incorrect), too limited to retain young people or to attract professionals, and too narrowly based to survive changing economic conditions.

Other things being equal, a tenure system that involves more people in decision making is a better system. Responsibility is fundamental to the development of human capacity. Involving people is costly, however. It requires taking time, sharing information, and, ultimately developing expertise and decision-making skills. For a forestry company there may be advantages to public participation, but in most cases, public participation is a cost. Modern management is designed to economize on intelligence and attention precisely because they are among the most valuable and costly resources a company can have. (*Prima face* argument that Hypothesis 9 is incorrect) For the community these costs are both investment in correct decisions and investments in human development similar to educational expenditures.

5. CONCLUSION

The most remarkable aspect of the policy regime for Northern Ontario is its astonishing failure in the second half of the 20th century to convert the enormous natural resource base into viable economic development in the region. In the absence of growth in secondary wood industry, labour-replacing technological change inevitably brings falling employment and closing mills. It is difficult to appreciate the magnitude of the resulting economic reversal.

Building on the forest resource is the only available development strategy for Northern Ontario. Expanding value-added production is virtually the definition of building on the resource base '[?]. The failure to make a transition from commodity production to wood-based value-added production in Northern Ontario is the evidence that the corporate tenure system does not perform as well as a community forest tenure system would.

Community forestry in theory offers a way to escape the underdevelopment trap. Community forestry can at least partially solve the four main failures of the existing tenures system, notably the lack of incentives for moving to value-added production, the lack of incentives to invest, the failure to take advantage of the full range of forest values, and the inability to mobilize local human resources and capital effectively. Theoretical considerations therefore strongly favour a change in the tenure system in Northern Ontario. Unfortunately there simply is no "science" of community forests. It is impossible to say with reasonable certainty at this point.

Economists since the time of Haavelmo (1943, 1944) have recognized the need for precise models to construct counterfactuals and to answer causal questions and more general policy evaluation questions, including making out-of-sample forecasts. [?]. The discussion of community forestry to date has largely ignored the need to specify precisely what is meant by a community forest. This omission is entirely understandable because there are in fact few or no relevant examples and because the problem is one of system design, not incremental tinkering.

This paper has made the case for investing much more effort in modeling community forests theoretically, a task that requires what some sociologists have called the "social imagination" combined with formal social science modeling. The job is daunting, but when the difficulties are compared to the costs of continuing the current approach to Canada's forests, the investment required is tiny. The potential economic and social benefit from finding an improved social forestry model are enormous, and the transformative effect for Canadian Social Sciences is, as the advertisements say "priceless."

REFERENCES

- [1] Moazzami, B., An Economic Impact Analysis of the Northwestern Ontario Forest Sector. Northwestern Ontario Forest Council 2006. Department of Economics, Lakehead University
- [2] Heckman, James J. (2005) The Scientific Model of Causality. *Sociological Methodology* 35 (1), 198.

- [3] Blais & Associates, Pan Northern Investment Attraction Strategy: Final Report. Prepared for the Pan Northern Steering Committee and the Department of Foreign Affairs & International Trade, December 2006.
- [4] Stigler, G. The theory of economic regulation., *Bell J. Economics and Management Science* 2, no. 1. 3-21 (1971)
- [5] Luckert Martin K. Towards a tenure policy framework for sustainable forest management in Canada *Forestry Chronicle* 73 (2): 211-215 March-April 1997
- [6] Luckert Martin K.. Are Community forests the key to sustainable forest management? Some economic considerations. *Forestry Chronicle*. 75:5 1999.
- [7] Teitelbaum, Sara, Tom Beckley, Solange Nadeau. A national portrait of community forestry on public land in Canada. *Forestry Chronicle*, vol 82, #3. pp 416-428. 2006.
- [8] Baumgärtner, Stefan Malte Faber, and Johannes Schiller. *Joint Production and Responsibility in Ecological Economics: On the Foundations of Environmental Policy*. Northampton, MA.. Edward Elgar Publishing. 2006
- [9] Coase, Ronald H., "The Nature of the Firm", *Economica* 4, pp 386-405, 1937.
- [10] Curry, Janel M. and Steven McGuire, *Community on Land: Community, Ecology, and the Public Interest*. Lanham, MD., Rowman & Littlefield Publishers, Inc. . 2002
- [11] Duinker Peter N., Patrick W. Matakala, Florence Cheng and Luc Bouthillier. *Community Forests in Canada: An Overview* *Forestry Chronicle* 70 (6): 131-135 Nov/Dec 1994
- [12] Harshaw, H.W., *Development of the Community Forest Tenure in British Columbia: An Examination of the BCMoF Community Forestry Initiative* PhD thesis, Faculty of Forestry Department of Forest Resources Management UBC, November 2000
- [13] Chernov, Julie. *Regime Shift: Economic Crises in Third Wave Democracies* Paper presented at the annual meeting of the International Studies Association, Le Centre Sheraton Hotel, Montreal, Quebec, Canada, Mar 17, 2004 Online http://www.allacademic.com/meta/p73268_index.html; 2006-10-05
- [14] Lawson, Jamie, Marcelo Levy and L. Anders Sandberg. *Change, Continuity and Forest Policy Regimes in Ontario*, in *Canadian Forest Policy: Adapting to Change* Michael Howlett, ed. Toronto. University of Toronto press. 2001,
- [15] Ostrom E., H. Nagendra. Insights on linking forests, trees, and people from the air, on the ground, and in the laboratory *Proceedings of the National Academy of Sciences of the United States of America* 103(51): 19224-19231 2006
- [16] Ostrom, Elinor *Designing Complexity to Govern Complexity*, in *Property Rights and the Environment*. Susan Hanna and Mohan Munasinghe eds Washington, D.C. Beijer International Institute of Ecological Economics and World Bank, 1995.
- [17] Robinson, D.. *The elementary Economics of Forest Tenure*, INORD discussion Paper 07-01, August 2007.