

**THE SCIENCE OF COMMUNITY FORESTS  
PART I: APPROACHING REGIME CHANGE SYSTEMATICALLY**

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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 experimental 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 describes the theoretical issue of regime choice and presents a framework for comparing the two regimes. Part II will examine theoretical arguments that allow comparisons with respect to specific socio-economic objectives.

1. INTRODUCTION

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Canadian provinces and especially Ontario are on the verge of making historic commitments about the way we will relate to the forests in the 21<sup>st</sup> Century. They are approaching those choices with with a fundamentally inadequate understanding of the human-forest interface. We have over 200 years of practice with a forestry system that has systematically failed to generate progressive, forest-based development in Northern Ontario. It is unlikely that the existing tenure system is even capable of producing social and economic development for the region.

Lukert [7] has argued that the tenure regime should be chosen to achieve society's basic management goals. The principle management goals until recently has been to expand commodity production, expecting that approach to provide the largest return for the province [24]. Tenure arrangements that suited the Sustainable Yield (SY) paradigm, [8]

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argues, are not suited to a newer regime that mimics natural processes, conserves diversity and supports varying degrees of multiple uses. The system was not intended to maximizing the long-run contribution of the forest, including through joint products and unpriced services based on the appropriate future climate conditions and price structures.

Furthermore, as the demands on the forest shift increasingly to environmental services and as market demand shifts increasingly toward higher value-added products a system designed for earlier times and empty lands may not be salvageable. We face climate change that may soon push us out of the range that existing science and management systems have known. Given the inevitable run-up of atmospheric carbon, the accompanying warming and the rising risk of wild instability, it may be necessary to actively manage the boreal forest as a climate modification device. Ultimately we are looking at a forest system that requires more people and has to produce more value than the current model. We have no significant experience in Canada with alternative forestry systems and we lack anything resembling a science of the human-forest system.

Since at least the early 1970's, community forests have been proposed as a systematic approach to organizing the relationship between human communities and forests that has the potential to improve both economic or ecological outcomes. According to Lawson, Levy and Sandberg, the case for real local control in forest policy, particularly for those at the short end of labour-shedding 'efficiencies' and monopoly control, has always been strong.[21]. The community forest concept can be tracked back to near the beginning of the 20th century in Canada<sup>2</sup>. The notion was addressed and endorsed in the 1945 Sloan Commission on the forest resources of BC (Harshaw, 2000)[18]. The approach has been gaining some ground in Quebec recently and is expanding dramatically in British Columbia. In Saskatchewan we the first nations have made remarkable progress based on pre-existing aboriginal tenure. The Canadian experience is surveyed in Duinker [15] and Teitelbaum et al [11] .. Furthermore, examples of robust systems and institutions where resources rights are held by a community and where those directly involved have successfully managed complex resource systems over long periods, abound [23].

Under one relatively loose definition Community forestry covers perhaps 1.3% of Canada's forests.[11] The definition includes, for example, municipal forests in southern Ontario that are barely more than large municipal woodlots. Loose definitions necessarily provide a heterogeneous sample, but even a loose definition yields too little data. Community forestry is simply an untried system. An untried system may be a wiser choice than one that has failed, but the very small experiments that are available simply cannot be extrapolated to a large scale implementation. This paper asks how choose of tenure regime in the absence of a population large scale and long lasting trials of one of the alternatives.

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<sup>2</sup>See Chapter 10 of Janel M. Curry and Steven McGuire, *Community on Land: Community, Ecology, and the Public Interest. A Tale of Two Countries for a revealing historical comparison of community forestry in Canada and in the USA.*[13]

Tenure is a general term used to refer to control of land, forests or other resources. Resource tenure is a fundamental social relationship that shapes the organization of production, the distribution of benefits, and the pattern of economic and social development [22]. Not surprisingly, the way forest resources have been made available to timber enterprises has always been at the center of the debate on forest policy in Canada [24].

In Ontario tenure in Crown forests is granted through statutorily based agreements whereby the Crown transfers rights to harvest timber or manage forest lands to another party, while retaining title to the land. We refer to the current practice of transferring tenure to privately owned corporations as ‘corporate tenure’ and the practice of transferring rights to harvest timber or manage forest lands to a corporation owned by the population<sup>3</sup> of a region as ‘community tenure.’ The practice in British Columbia of transferring rights to a locally controlled organization constituted under the societies act but not by all the people of the region is ‘social forestry’ in this framework. Tenure held by one or more first-nations is community forestry in this framework.

Since one of the key problems in discussing forest tenure reform is that no one seems to have a scalable model of a community forestry, community forests will be defined as follows:

**Definition 1.** *Community forest: a forest which provides the economic basis of a community and for which tenure is held under some form of local democracy.*

The requirement that a community forest provide the economic basis of community forces us to think at the appropriate scale. The requirement that tenure be held under some form of local democracy provides the link to the objective most commonly used to define community forestry - management for the benefit of the community. Intentions are rarely useful markers in scientific definitions, so a definition in terms of institutional structure is preferable to one which relies on objectives. Making tenure holding the central element in the definition allows for variety of management arrangements and forest practice.

**1.1. Structure and process.** It is helpful to have at least a plausible structure in mind. The simplest model would involve forest tenure held indefinitely by the municipal government, managed by a municipal corporation. Such a corporation would be capable of exactly reproducing the current harvest pattern and the current wood allocations. The initial arrangements might be designed to minimize disruptions while opening new possibilities. Crown forests would remain under public ownership and management would be increasingly decentralized, just as in the current system. The Minister would retain the final say about Forest Management Plans. Nothing would prevent the Ministry from

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<sup>3</sup>The term is convenient and conventional but not particularly precise. Strictly speaking municipal tenures and cooperative tenures are also corporate tenure. Corporations and societies are individuals under the law and tenure can only be held by an individual.

its current efforts to reduce transaction costs and remove rigidities in the wood allocation process<sup>4</sup>

To create a particular community forest the Minister might invite municipalities to create Community Forest Corporations with the assistance of MNR. The Corporations would accept existing commitments and maintain existing wood flows for a specified period. It would operate under the existing forest management plans. Changes would be reviewed by the Minister as currently required. The Corporation would almost certainly hire the foresters that created the forest management Plan, and the previous SFL holders would be relieved of the burden. The forestry management system would continue to be funded out of revenues. The Forest Renewal Fund would continue as at present. The Minister might require that local consultative committees be formed to ensure that mill owners, loggers and other stakeholders are systematically consulted

The Crown Forest Sustainability Act gives the minister the authority to institute a system of Community Forests along these lines.

37. (1) The Minister may, subject to the Public Lands Act and to the provisions of a licence under section 26, sell, lease, grant or otherwise dispose of land that is subject to a forest resource licence.

(3) A sale, lease, grant or other disposition of land under this section terminates the licence in respect of the land and terminates all rights of the licensee in respect of forest resources on the land. 1994, c. 25, s. 37 (3).

This paper is concerned with whether the minister should exercise that authority.

1.2. **Regime choice.** A tenure system is a set of rules, both formal and informal that regulate the operation of government and interactions among members of society. The term regime suggests prevailing social system providing a fairly consistent and stable pattern within which members of society can form expectations and govern their behaviour. There are many possible regimes. Chernov [20] defines *regime shift* as a movement among alternatives within the democratic structure.

In the language of the political branch of game theory, regime change is a constitutional game is one that sets the rules of play. Game theorists, however, focus on the payoffs that a set of rules imply. Focussing on payoffs is important because any set of rules allows for choice. There are within each regime many possible outcomes. Specifying the payoffs for each combination of choices often makes it possible to identify what players will do, at least if they respond rationally to payoffs.

The Minister and the provincial government are engaged in a constitutional game with respect to the rules governing forestry. A excessively simple but useful way to represent the game has only three players, the Minister, the forest companies and the communities. The constitutional game consists of two simple two-player games with payoffs for three

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<sup>4</sup>The so-called cooperative SFLs are intended to reduce management costs and improve allocation.

players. The Minister chooses the regime and the other two players play strategically to achieve the highest payoffs they can given the rules of the regime chosen.

We imagine, first, that the a prevailing regime under which companies and the communities make their choices. It is represented by the payoff matrix on the left in Table 1. While the players have many choices leading to a variety of payoff combinations, we observe only the outcomes of actual choices. Game theorists conventionally assume that the players make “best responses,” meaning that they would be worse off if they unilaterally changed their strategies. The result is known as a Nash equilibrium. The equilibrium strategies and payoffs are indicated with bold type<sup>5</sup>.

Payoffs in Table 1 are purely illustrative. In the real world payoffs are difficult to determine. Firms may be able to hide their financial payoffs, individuals may lie about their non-financial payoffs for strategic reasons, many payoffs may be excluded from the calculation. The payoffs for non-human forest dwellers may be left out. These complications don’t affect the logic of our case, although they should be taken into account in any practical decision.

The concept of a regime change implies there is a super-game which includes both alternative regimes and the possibility of choosing between them. The alternative regime is represented on the right Table 1. In this game the rules differ, and the payoff structure varies as a result. There are many alternative regimes in principle, and we illustrate one which has a socially preferable equilibrium that resembles the outcome of the prevailing regime. Again the equilibrium is indicated using bold type. The Minister may choose to change regimes, after which companies and the communities make their choices. At this stage payoffs for the Minister/Province is indicated with an  $x$ ,  $X_1$  or  $X_r$ . The Minister’s payoffs are a matter for discussion. They might be calculated as the sum of the payoffs to the community and the company. Alternatively, in some jurisdictions they might be determined by the size of the bribe offered by the community or the corporation. Company bribes might be in cash and community bribes might be in votes. Economists have long debated the payoffs that a good government should, and have always recognized that politicians may not base their decisions on the payoffs that economists recommend using. It is important to emphasize that the the payoff to the minister, however it is calculated, depends on the decisions of the other players.

In the example the first number in each cell is the payoff to the community through wages. The second is profits for the company, and the third is the payoff that the minister considers. It is assumed that the total forest product and wages is increased by community

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<sup>5</sup>An equilibrium can be inefficient or unfair. There may be more than one equilibrium and it is possible for the players to land on an inefficient one. In *coordination games* it is possible for players to jointly change strategies to achieve a more efficient equilibrium provides they can establish sufficient trust. Policy interventions are often based on the assumption that problems arise from *coordination failure*. This paper is not concerned with problems that can be solved without regime change.

forestry because it is highly likely that community forestry would increase local value-added production. Potential value-added products are included in the community payoff. Benefits outside of the region might be counted in the minister's payoff if the minister has the foresight to do count additional tax revenue and other public gains. Since there are no operating community forests, it is unclear what the real numbers should be. This paper will move on to making guesses about the relative sizes of the payoffs based on economic theory.

corporate tenure			community tenure		
	produce	leave		produce	leave
cooperate	50, 50, $X_l$	0, 0, x	sell	75, 45, $X_r$	75, 0, x
obstruct	25, 25, x	0, 0, x	don't sell	50, 0, x	50, 0, x

TABLE 1. Corporate tenure and community tenure constitutional game

## 2. THE SCIENTIFIC QUESTION

Only the  $\mathbf{X}_l$  and  $\mathbf{X}_r$  in Table 1 are relevant for the minister. She will take into account the payoffs for the two players and a possibly large number of other factors. Ideally she would commission a complete and systematic cost and benefit study. Such studies are never done and may not even be possible.

It may, however, be possible to finesse the Minister's data problem by using the fact that it does not matter how large  $\mathbf{X}_l$  and  $\mathbf{X}_r$ . The decision for the Minister really turns on whether  $\mathbf{X}_l$  is larger or smaller than  $\mathbf{X}_r$ . Is it possible to decide if  $\mathbf{X}_l$  is larger or smaller than  $\mathbf{X}_r$  without calculating the value of every component of the  $\mathbf{X}_l$  and  $\mathbf{X}_r$ ?

The Minister is expected to consider the effects of a possible regime change as they work through multiple processes. It is necessary to consider each separately. If the impact of regime change on each process can be "signed," and if the impact on all or most processes has the same sign the Minister confidently sign  $\mathbf{X}_r - \mathbf{X}_l$ . Many of the relevant effects are captured in the following hypotheses:

*Compared to a community forestry tenure system, the existing industrial forestry model will<sup>6</sup>*

- (1) *produce more wealth* (wealth hypothesis)
- (2) *produce more jobs* (employment hypothesis)

<sup>6</sup>The hypotheses are framed in this way to avoid what might be called "incumbent bias" - the tendency to exempt the existing model from tests and to demand that the alternative pass excessively stringent tests. The danger in setting up the hypothesis to favour the existing regime is easy to see if we imagine the passengers on a sinking ship asking, "Are we sure we won't drown if we try to swim to shore?" A passenger who has taken introductory statistics might think it was wise to insist on a 95% confidence level. The passenger who asks "Are we sure we will be safe if we stay with the ship?" might make a different choice.

- (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)

It is unlikely that many observers would confidently accept all or even most of these hypotheses. It is possible that most observers would reject them, making a *prima facie* case for regime change. How could the Minister test the various hypotheses about the forestry regime? The obvious answer is to set up a series of controlled experiments and take careful measurements. On the surface, controlled experimentation (CE) seems like the most scientific approach possible. It is an idea that is being discussed by at least a few people within MRR in Ontario, very much to their credit. Nonetheless, CE has fundamental problems.

An experiment differs from non-experimental methods in that it involves the deliberate manipulation of one variable, while trying to keep all other variables constant. The more uncontrolled variables there are, the more cases are required. Institutional experiments tend to have large number of uncontrolled variables, as anyone who has worked to build or change an organization knows.

The nature of historical data presents another fundamental problem One central “variable” in any evolving system is the development period. Conventional forestry in Canada has evolved over a period of two hundred years. The current system is mature in the sense that the components have been optimized and a system of markets has been developed to support it. Any community forest used for comparison will have a been designed on a one-off basis by people without experience in community forestry. The tools will be adapted from current practice, often poorly and sometimes at great expense. Any experimental test will be like comparing one of the first prototypes of the Blackberry to the Bell System. The experimental approach is simply not logically credible for evaluating regime change. It represents a fundamental misunderstanding of the evolutionary and ecological nature of social processes<sup>7</sup>.

The irony is that if CE is attempted it will be under the guidance of public sector scientists who believe that they are qualified to set up and evaluate the necessary experiments. In fact CE is simply not feasible, and the attempt we are likely to see will be based an a profound misunderstanding of the scientific method.

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<sup>7</sup>The same arguments apply to Quasi-Experimental methods.

There are several useful lessons to draw from the preceding paragraphs, however.

- (1) small scale experiments will not provide adequate tests of any of the core hypotheses
- (2) short experiments (less than a century) may not provide adequate tests of any of the core hypotheses
- (3) experiments in which the market environment has not had time to evolve will not provide adequate tests of any of the core hypotheses
- (4) experiments using currently available technologies may not provide adequate tests of any of the core hypotheses

Slightly less obviously, the discussion to this point suggests that

- (1) People in the forestry industry have no relevant expertise regarding the social organization or merits of community forests. They have neither experience nor training. (they may have very important knowledge about technical aspects of forestry that would carry across to a different system, however)
- (2) forestry scientists are not equipped with the social science training and imagination needed to frame the required experiments even if they were feasible.
- (3) Community development practitioners, animateurs, and people who have experience in creating new organizations may have useful skills and experience
- (4) Sociologists, economists, political scientists and anthropologists are likely to have have valuable insights and techniques

Although the argument to this point seems to suggest that the the problem of evaluating regime change is intractable, in fact it points to a feasible method. First, it is necessary to identify the major processes and mechanisms that contribute to the Minister's evaluation function,  $\mathbf{X}_i$ . Second, it is necessary to specify specific institutional structures for the new regime. Third, comparisons should be restricted to "optimized" versions. Practically, this means that for each of the hypotheses above the evaluator should try to design a version of community forestry that dominates the existing regime. For example, when considering the human development hypothesis, the evaluator should ask "Can I find a way to organize a community forest that will reliably result in more human capital being created?" Finally, having found forms that generate the largest contribution to  $\mathbf{X}_r$  separately, the evaluator has to look for a forms combining the features that achieve gains on the individual criteria.

the argument here is that evaluating a potential regime change demands a series of creative acts in order to produce the appropriate model for comparison. As James Heckman notes, "Models are not empirical statements or descriptions of actual worlds. They are descriptions of hypothetical worlds obtained by varying - hypothetically - the factors determining outcomes." [2] To quote Heckman again, "Science is based 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 imaginative act of specifying an imaginary world. It is at this point that the research community has largely failed to engage the problem.

### 3. CONCLUSION

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. [2]. 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.”

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