

Small-scale Forestry – Is it simply a smaller version of Industrial (Large-scale) Multiple Use Forestry?

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ABSTRACT

This paper explores the question of whether small-scale forestry is simply a scaled-down form of industrial forestry. The nature of small-scale forestry is first explored, including a discussion of the types of forest activities that generally classified under this term. The motivation of large scale forestry is then outlined followed by a detailed discussion of the motivations of small-scale foresters are discussed and compared with those of industrial foresters. A model explaining the difference between small-scale and large forestry is then proposed. This model posits that profit motive is the primary objective with industrial forestry and which results in environmental and social considerations being regarded as constraints moderating the maximisation of profit. The resulting 'multiple-use' industrial forestry is the result of external forces on the firm. In contrast, small-scale forestry has multiple objectives, encompassing a range of social, environmental and economic objectives which are unique to each small-scale forester. The nature of small-scale forestry is shaped not only by external forces, but also 'internal' forces associated with the beliefs, desires, personal circumstances and motivations of the small-scale foresters.

INTRODUCTION - WHAT IS SMALL-SCALE FORESTRY?

No universally accepted definition exists for small-scale forestry. Small-scale forestry encompasses a range of forestry systems or terms applied in different ways in different countries. Harrison et al. (2002) in the first article of the first issue of

Small-scale Forest Economics, Management and Policy gave a concise overview of the concepts of small-scale forestry in various countries. In this overview, various alternative terms for small-scale forestry were identified. For instance, Non-industrial Private Forestry (NIPF) is the term commonly adopted for small-scale forests in the USA, although the use of family and farm forestry is commonly used in some states. In Europe, a variety of terms are used to describe various forms of small-scale forestry including non-industrial forestry and family forestry. Terms such as 'farm woodlands', 'farm forests' and 'privately owned forests' are also used. In Japan, there is a long history of 'family owned forests'. In Australia the term 'farm forestry' is commonly used, although 'agroforestry' has gained some popularity in some quarters as there is a push to incorporate forestry into the farm business. The term farm forestry is also commonly used in New Zealand. In many Asian countries such as the Philippines and Indonesia, the use of terms such as 'smallholder tree farmer', 'smallholder forestry' is common.

Small-scale forestry can have a significant economic importance at an aggregate level. In Nordic countries, small-scale foresters own approximately 60-70% of forest land. For instance, in Finland, there are in excess of 600,000 family forest owners, controlling 62% of the forest area (Lillandt, 2001). In the US, NIPF accounts for 59% of the total timberlands in the US and contributes nearly 50% of the timber production (Zhai and Harrison 2000).

Harrison et al. (2002) note that in most developing countries, community forestry is more aligned with small-scale forestry than with

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industrial forestry. Community forestry areas are usually small relative to the areas of the equivalent type managed under industrial forestry (e.g. plantations or native forest areas). Importantly multiple use management is strong in both community and smallholder forestry. For these reasons, community forestry is often considered to fall under the umbrella of small-scale forestry, and this is the case for articles considered for *Small-scale Forest Economics, Management and Policy*.

This paper explores further what makes small-scale forestry different to industrial forestry. The first section discusses the motivations for industrial forestry in terms of wealth maximisation. A detailed discussion is then undertaken about how small-scale forestry differs from industrial forestry. The paper then concludes by briefly outlining a conceptual model to explain the difference between small-scale and large-scale multi-purpose forestry. In paper, the terms industrial forestry and large-scale forestry are used interchangeably.

THE MOTIVATIONS FOR INDUSTRIAL FORESTRY

For companies, the goal of the firm is generally considered to be wealth maximisation and is measured by net present value (NPV) of future cash flows associated with a project (e.g. Dayandra et al. 2002). Discounted cash flow analysis is used to calculate NPV. Land Expectation Value (LEV) – in effect the NPV of an infinite chain of tree rotations – provides another useful financial performance criterion, particularly when the objective is to compare species with different rotation lengths. Importantly, LEV represents the maximum amount that an investor could pay for land for plantation establishment and still return a positive NPV for the plantation investment.

In the case of industrial forestry companies the profit maximisation motive effectively translates into maximising the value of their plantation estate. Decisions about what species to grow, what areas are planted, the management regime and harvest scheduling are all made on the basis of maximising the value of the firm to investors.

This is not to say that industrial forestry companies do not consider environmental and

social impacts of their plantation estate. However, social and environmental considerations can be viewed as constraints to a company's operations in order for it to commence or continue its activities. For instance, a company may set aside areas for permanent conservation along creek banks or to leave a certain number of large habitat trees. Sometimes these environmental decisions are regulated, at other times a company will voluntarily make the decision. In either case, the company's primary responsibility remains to be one of wealth maximisation for its shareholders.

CHARACTERISTICS OF SMALL-SCALE FORESTRY

The following sections discuss some of the ways in which small-scale forestry differs from industrial forestry. In structuring this discussion, we taken the approach of working through the production cycle from when a small-scale forester decides to plant trees through to the harvest and sale.

Getting Involved in Small-scale Forestry

Industrial forestry companies make a rational decision based on financial analysis to either purchase existing forest land or to create a new forest estate. The basis of this decision is largely that of the criteria of the investment returning a positive NPV based on expected timber income. Sometimes other factors such as expectations of increased land values may also be considered as part of the evaluation process. In contrast small-scale foresters may acquire forest land or decide to plant trees for many reasons.

Acquisition through Inheritance

In countries with a long history of small-scale forestry, which is particularly the case in Europe and Japan, current owners often have inherited their forests. The inheritance laws vary widely between countries however, with sometimes the entire estate being kept together and passed onto one family member. In other cases, the inheritance laws dictate that the estate is spread between the spouse and children.

The fact that small-scale forests are not acquired through a direct cash transaction may have a strong influence on the way that the forests are managed and viewed by the owners. In cases where there is a strong family connection with the land and the forest on it, the forest is often highly valued. In some ways the forest may be viewed as being an integral part of the family history, with one generation growing up in the forest, raising their own children and then wishing to give their children the same experience and so on. In such cases, timber production may be a very small component of the forest and any revenue regarded as a means of paying the holding costs. There are also increasing numbers of people who inherit small-scale forests who are absentee owners based in cities. These absentee landowners are increasing in number and often do not have the capacity not will to manage their forests for timber production. In these cases, there is often little connection with the forest. In countries such as Norway, these absentee landholders present many challenges to the management of the private forest resource (Barstad pers. comm.).

Creating New Forests

Once again, the decision for industrial foresters to plant new forest areas is largely a financial decision. The species considered are usually those for which there are well established silviculture, improved genetic stock, ready markets and well established silviculture. The impact of discount rates on the NPV of the project also means that there is a strong bias towards species with a shorter rotation period. In the case of small-scale foresters, the motivations for creating new forests are highly variable, with financial motivations being only one of many possible motivations. For instance in subtropical and tropical north Queensland, many landholders establish plantations for mainly environmental reasons with economic reasons being considered least important (Herbohn et al. 2005)

Selecting Species

Small-scale foresters select species for a number of non-financial reasons. In Europe, small-scale

foresters are much more likely to choose slower growing broad leaf species than softwoods for a variety of reasons. Aesthetic considerations are often important, especially when the trees are being planted on a farmland which the owner occupies or when the forests are an integral part of a farm stay operation such as is common in the Black Forest Region in Germany. It is also common for farm foresters to want to plant trees that also enhance biodiversity and small-scale foresters are much more likely to plant mixtures of species, particularly natives. Many farm foresters also like to experiment with untried species, as is the case with native rainforest species in the tropical and subtropical areas of Australia (Maczkowiack et al. in press).

Managing Forests for Timber Production

Small-scale foresters can vary markedly in the way in which they manage their forests. In some cases, the silviculture practices they adopt are similar to those adopted in industrial forestry. There is however a number of important constraints and differences in motivation that can result in large differences between the way industrial and small scale foresters manage their resource.

Time constraints

Lack of time often constrains or restricts the timing and intensity of silviculture by small-scale foresters. For small-scale foresters resident near their forests, there are often competing agricultural and other activities which are either necessary or generate higher immediate levels of financial or personal benefits. For instance, many owners need to undertake as a priority other farm activities such as cropping, tending cattle or managing farm stay operations. In addition, many resident landholders have off-farm employment which restricts the time available to spend on managing their forests. There are also an increasing number of landholders who are resident some distance from their forests, often in major cities. In these cases, there are additional time constraints in terms of travel time to the forest.

Lack of skills and financial capability

Large forestry companies employ specialist foresters to manage their forests – with the level of expenditure on forest management activities being determined by the activities generating a positive NPV. In contrast due to the high up front costs and long wait for eventual returns, many small-scale foresters lack the financial resources to apply financially optimal management practices to the forests. Also small-scale foresters lack the technical knowledge to undertake the work themselves. In part this can be offset by advice from government forestry extension staff, although funding for these programs appears to be under increasing pressure in many countries. Silviculture operations in industrial plantations are either undertaken by staff employed directly by the corporation or on a contract basis. Often small-scale foresters do not have the financial capacity to afford such operations. The net result of lack of skills and the lack of financial capability to fund operation is that silviculture in small-scale forests is often below the quality and intensity usually applied in industrial forests. This however is not always the case, with some landholders seeing silviculture activities as a form of recreation, and the result is a very intensively managed forest.

The lack of training and appreciation of the need for good silviculture can also lead to poor management decisions. For instance, many smallholder tree farmers in the Philippines do not thin their tree farms because they believe that more stems translate directly into greater returns and that thinning to waste means losing money associated with the past expenditure on the seedlings. If smallholders do thin, it is common for them to select the better trees as these are of higher immediate value, thus leaving the trees with poorer form and growth. In addition, lack of technical expertise can lead to pruning practices that make the tree susceptible to disease and insect attack or in the delay or failure to prune even though doing so would increase the NPV of the stand – these mistakes or oversights are seldom made by managers of industrial forestry estates.

Higher Importance Attached to Non-timber Benefits

There is ample evidence in the literature that small-scale foresters value non-timber values of their forests much higher than the timber production functions. These attitudes have important implications for the way in which forests are managed. Owners may value use and non-use functions such as recreation, wild food collection and ecological functions so highly that they manage their forests entirely for these benefits with timber production being considered a secondary or even incompatible use. In this case ‘management’ may in fact translate into ‘no management’. No management may also result from a low value being placed on the forest land, such as is sometimes the case when city-based owners have inherited forest in which they have no interest.

Harvest Decisions and Timber Marketing

Infrequent harvests and lack of market awareness

The sale of timber by many small-scale foresters is made infrequently. Even in the case of active small-scale foresters with larger holders, such as many in the Black Forest region in Germany, many only sell timber every 5 or 10 years. In the case of many other smaller growers, the sale of timber may occur only once or twice in their lifetime. This means that they are operating in markets that they have little or no understanding and experience – thus opening up the opportunity for sub-optimal decisions leading to lower prices. Industrial forestry companies on the other hand are very aware of both current and future market trends. They often have developed long term relationships both vertically and sometimes laterally within the timber supply chain. In addition, large scale forestry brings economies of scale and market power which small-scale foresters lack. To some extent small-scale foresters can achieve similar relationships and economies of scale through cooperation. Metsaliito Cooperative in Finland is an example of how small-scale foresters can aggregate their activities. Metsaliito has 131,000 members who together own 48% of the private forests in Finland. The forest owners revenue from

their wood sales to the cooperative amount to almost EUR 500 million annually (Metsäliitto Cooperative 2006).

Suboptimal harvest decisions and the forest as a bank account

Survey evidence suggests that many smallholders make the decision to sell based on other factors than maximising economic returns. Under conditions, higher timber prices would mean that a forest owner would increase their harvest in order to capitalise on the higher demand i.e. an increase in price results in an increase in supply. With small scale foresters, this normal reaction to increases in supply does not always occur. In Sweden it has been suggested that farmers harvest enough timber to purchase a Volvo (or other major expenditure) and then stop – which means that higher prices could actually lead to a reduction in the amount of timber harvested (Johansson and Lofgreen 1985). The ‘Volvo effect’ has been well documented and typifies how many small-scale foresters see their forests as a bank account that can be accessed when they need to make a large purchase or fall on hard times.

This ‘bank account’ view of forests appears to be widespread and extending well beyond Scandinavia. For instance, forester owners in Japan may harvest one or two very high value trees – sometimes 300 – 400 years old – to support the education of a child, purchase a car or when a daughter intends to marry. In Australia, farm foresters often see the trees they plant as creating a bank account for their retirement or adding to the value of their property which they can realise at a later date (Mackzowiack et al. in press).

There is an emerging literature which deals with the decision processes associated with the harvesting of timber from small-scale forests. In this literature recognition is given to the fact that the motivations for holding forests is varied and that income (and the related stumpage price) is only one part of the mix. For instance, Pukkala et al. 2003 used a utility maximising approach to predict harvests from private forests in Finland based on different management goals – economic security, timber sales, recreation and nature values.

Similarly, Fina et al. (2001) has suggested that amenities and mature forest stocks may reduce a debt-burdened landholder's willingness to accept lower reservation prices (and cut sooner) because there are additional benefits to holding forest stock and carrying the debt further into the future.

Industry Organisation and Role in Rural Development

There are often substantial differences in the organisation of forest industries based around industrial and small-scale foresters. Industrial forestry companies have large estates that can be managed in a coordinated manner. By its very nature, small-scale forestry results in a scattered estate under control of many individuals. The invariable heterogeneity of the owners, their motivations and the sometimes variably quality of the resource they control, can pose significant problems for effective industry organisation. This can be for both processors and producers. There also appears to be evidence that small-scale forestry can have different social, economic and environmental impacts on a region.

A CONCEPTUAL MODEL

The preceding discussion has illustrated that small-scale forestry is different in many ways to large-scale industrial forestry. These differences manifest themselves in many ways – ranging from the manner and motivations for small-scale foresters to acquire and hold onto their forests, through to the way in which the forests are managed and in making of harvesting decisions.

A model to explain the difference between small-scale and large forestry is proposed. This model posits that profit motive is the primary objective with industrial forestry and which results in environmental and social considerations being regarded as constraints moderating the maximisation of profit. The resulting ‘multiple-use’ industrial forestry is the result of external forces on the firm. In contrast, small-scale forestry has multiple objectives, encompassing a range of social, environmental and economic objectives which are unique to each small-scale forester. The

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