Rural development forestry in the United Kingdom*

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Summary

Rural Development Forestry (RDF) has been widely advocated as a means of better meeting local needs and demands on forests, in comparison with conventional forest practice. The roots of RDF can be found partly in developing countries and partly in new ways of addressing rural development in developed countries, especially in the European Union. In Scotland in particular, a wide-ranging critique has been levelled at conventional forest practitioners for failing to realize the full range of potential social and economic benefits at a local level. This paper explores the financial and economic feasibility of three locally derived options for RDF, which included amenity and employment enhancing forest-related actions, by comparing their returns with those of conventional systems. Using a range of discount rates and a modified Forest Investment Appraisal Package, the results of the study indicate that in the two areas investigated (Wester Ross and Morayshire), using a limited range of non-market estimates, the RDF options generated lower financial and social outputs than the conventional systems, and the cost per job created is high compared with typical cost per job figures in the regions studied. These estimates should be treated with some caution as they are location-specific and do not include all external costs and benefits. More detailed research at a local level is recommended as a means of ascertaining whether or not there is a clear financial and economic rationale for RDF.

Introduction

In the last decade, new styles of forestry have been promoted in the UK in response to a variety of pressures, some of which relate to the changing market environment, but most in response to changes in the wider sociopolitical climate within which the industry operates. In this paper, the changes in the policy environment that have impacted on forestry will be explored, with particular reference to the recent concern about the relationship between forestry and rural development.

Rural Development Forestry (RDF) is an umbrella term describing locally-centred approaches to multi-purpose forestry. Although the concept originated in forestry developments in developing countries, it has been advocated as an approach to forestry principally in remote rural parts of the UK, as a means of addressing a perceived need for resource-based rural development. Rural Development Forestry is used in this paper as a

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* An earlier version of this paper was presented at the Annual Meeting of the ICF, Edinburgh 1997.
generic term for a style of forestry that recognizes and responds to the needs and demands of local communities for forests to satisfy a variety of demands. Other widely used terms for the same style of forestry include social forestry and community forestry. All of the terms stress local involvement in planning and local accrual of multiple benefits (Inglis and Lussignea, 1994 (unpublished); Slee, Clark and Snowdon, 1996 (unpublished)).

The existence of the term ‘Rural Development Forestry’ implies that there is another type of forestry that does not support rural development, or alternatively gives rather less support to rural development than does RDF. It immediately raises questions about the style of forestry and the nature, location and beneficiaries of forest-related developments. In so doing, forestry simply becomes an illustration of the point that ‘development is essentially contested and the ideological content of development is important in its evaluation and analysis’ (Buller and Wright, 1989).

This paper first examines the changing policy context in which the merits of RDF are being debated and then analyses the economics of RDF using adapted investment appraisal models. A two-stage approach is adopted. First, the financial appraisal of RDF options is carried. This is followed by a partial cost–benefit analysis, which includes estimates of external effects derived from previously published work. It then draws conclusions about the likely progress of RDF in the UK, with particular reference to the Scottish situation.

Decision making about forest policy has been and continues to be pulled in different directions by competing ideologies and policy for the forest sector occupies a public position more prominent than merited by its financial contribution to overall economic activity. It is a sector that is, above all, visible to the general public, and which, at various times, has impacted significantly on its general welfare. The changing and increasingly multi-purpose nature of forestry makes it a domain ripe for influence from the different stakeholders in the UK countryside. The many conflicting demands mean that forestry often has a symbolic status in the debate about how our land should be managed and different communities use a variety of means to give weight to their particular interests.

How can this policy context be better understood? First, it is necessary to understand policy development at both UK and EU1 levels, not least because the future of forestry in the UK owes as much (or more) to the shape of the agricultural policy and its resultant support to farmers than it does to the changes in forest policy per se. Second, we need to explore the economic rationales behind actual and proposed changes in policy and understand the economic implications of likely changes. It is beyond the scope of this paper to examine all of the above in relation to forest policy as a whole. Instead, an attempt will be made to review these issues in the context of the growing interest in Rural Development Forestry (RDF).

A policy perspective on RDF

Forest policy

The policy context for forestry in the late 1990s is more complex than at any previous time this century. The forestry policy community has been described as tight-knit (Winter, 1996) and given the history of forestry in the present century, this degree of closure is understandable. Not only is there only a relatively small population represented by the Timber Growers Association (TGA) but there is also a cadre of public sector foresters with a strong commitment to furthering the cause of forestry in the UK. This has meant that policy has been largely shaped by an alliance of public and private sector forestry interests and various government departments, until the recent entry of environmental and community development interests into the policy-making arena.

It is apparent that forest policy in the UK is being pulled in at least four opposing directions. The first direction is to make forestry a financially viable proposition. This has resulted in intense scrutiny by inquisitorial bodies such as the Treasury and the National Audit Office and resultant significant policy changes and has perhaps led to the neglect of social and RDF-related issues.

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1 The term EU will be used throughout this paper, except where explicit reference is made to the European Commission as a functional entity.
Second, there has been a growth of concern about the environmental effects of forestry (e.g. Tompkins, 1989) which has also resulted in significant policy changes. Third, there is a growing concern about the social dimension of forestry, often associated with a land reform agenda, which has not yet received the policy response sought by rural development activists. Fourth, but by no means least, is the community of professional foresters, which seems driven by a set of productivist beliefs that is independent of Treasury prescriptions, environmentalist whims or community development interests.

The forest sector in the UK owes its existence (in its current form) to a policy response to strategic concerns about deficits of timber in a war of attrition, and its continued development to a combination of opportunistic afforestation using legitimate tax avoidance and flexible, environment-leaning responses to a changing policy climate. Indeed, Winter (1996) comments on the success of the forestry policy community in adapting to new demands, especially in relation to the environment. However, RDF does not figure as a contemporary issue in Winter’s somewhat anglocentric interpretation of forest policy development, though he does acknowledge a degree of antagonism to the ‘Englishness’ of the Forestry Commission in Wales.

The origins of RDF can be found principally in developing countries, where ‘alternative’ locally based forestry projects were promoted from the mid-1970s to address problems of the growing local demand for a variety of forest-derived products to enhance household welfare, especially of the rural poor. An ability to meet local demands for fuel, small construction timber and tree fodder and the multi-purpose use of forests as areas for food gathering and production, have been characterized as typical features of RDF. While conventional quasi-colonialist approaches to timber extraction and production are reputed to have largely ignored the multiple functions of forestry and the particular importance of access to forests for the rural poor, RDF directly responded to the needs of the rural poor for multi-purpose forestry. RDF has been promoted with varying success in many developing countries, particularly in Asia.

A second source of ideas about RDF can be found much closer to the UK. In many parts of Europe there are different types of forest ownership and different styles of forest management from those that dominate in the UK. In Italy, France and Germany there are significant areas of forests owned by local communes, which meet a variety of local demands, for example for fuelwood and amenity (Merlo, 1989), as well as supplying more conventional timber products for developed countries such as pulpwood or sawlogs. In Scandinavian countries, there is also a higher level of ownership and management of woodland and forest by farmers, who are often able to integrate woodland management with their other economic activities in ways that create economic benefits for themselves and the local community (Reforesting Scotland, 1994). Moreover, there is some evidence to suggest that many Scandinavian farmer-foresters do not manage their woodland actively and that the extent of local benefits arising may be exaggerated. However, while ownership of forests in Scandinavia might be different, the substitution of farm labour by contract labour using high technology equipment has led to major reductions in forest-related employment (Hyttinen et al., 1996).

The Forestry Commission occupies a powerful position in UK forestry, both as a major landowner and a major player in shaping forest policy. It has recently been subjected to strident criticism, including being described as the ‘last bastion of British colonial forestry’ and for emphasizing amenity concerns at the expense of local economic development, in spite of a commitment to furthering rural development (Inglis and Guy, 1996). In spite of substantial changes in the forest grant (and wider) support system in the last decade and its evident responses to pressures for sustaining and enhancing access and environmental quality, the Forestry Commission is described as being ‘immune from external influences such as democratic control’ (Inglis and Guy, 1996, p. 24).

The RDF critique of current UK forest policy is closely intertwined with a critique of present landownership patterns, which (until recently) have made it difficult for tenant farmers to engage in farm forestry like their Scandinavian counterparts (Callander, 1995). This landownership structure has given large (sometimes absentee) landowners control over resource-based activity over very large areas of rural Scotland, where
sporting interests are pursued on land that previously supported 'productive' (i.e. farming or forestry) activity. The pattern of landownership has long been held to be a constraint on resource development (Wightman, 1996). The Forestry Commission is thus regarded by some simply as another example of an external agency, owning and operating its assets in its interests rather than those of the wider community.

RDF has acquired a particular salience in Scotland as a result of strongly articulated criticisms of state and private forestry practices by pressure groups such as Reforesting Scotland, which have developed an alternative agenda for forestry in Scotland based on land reform, local ownership of resources and multi-purpose forestry based on local employment creation and local needs satisfaction. This critique is highly rhetorical and (usually) covertly political, but has been sufficiently effective to stimulate the Forestry Commission to fund research into the topic and support a number of partnership initiatives, such as the Forests and People in Rural Areas Initiative (FAPIRA), which although nominally a UK organization, is predominantly Scottish, and the Laggan initiative which is the current showpiece response to the demand for RDF in Scotland.

Alongside the RDF critique, evidence exists of a variety of initiatives in which forestry agencies have combined with others in pursuit of rural development and environmental enhancement objectives. Highland Birchwoods has been formed by a number of agencies to promote both environmental and economic development of the resource in the north of Scotland. The Millennium Forest for Scotland has been active in promoting new afforestation with a view to promoting local benefits. In more peri-urban areas, the Central Scotland Countryside Trust has been active in environmental regeneration through tree planting. These partnership organizations or trusts indicate a broadening of the domain of forestry and the expanding range of institutions operating in rural areas.

**Rural development policy**

The second arena of policy change is in national and EU policy towards rural areas. New ways have been formulated to address long-standing problems. Over the last decade, and especially over the last 3 years, there have been significant reorientations of policy at UK and EU levels, which broadly reflect much wider changes throughout OECD member states (OECD, 1990) and at times borrow techniques from developing countries (Chambers, 1983).

At a national level the partnership approach has been advocated with a particular emphasis in Scotland, although this approach had already been applied without ministerial endorsement for some time in various parts of the UK, such as in the Rural Development Areas of England, in Tourism Development Action Programmes and more recently in rural strategies produced by local authorities. The partnership approach has been widely advocated as a model to address the challenge of rural development. It has been used in North America as a means of empowering local people and enabling groups to work together more effectively at a local level. The Scottish White Paper of 1996 (Scottish Office, 1996a) explicitly advocates partnerships as a means of moving decision making to a local level and encouraging communities to 'self-start' (Scottish Office, 1996b). Partnerships may be topic-based, area-based or strategic, although the dividing line between these categories is not always clear.

Since 1987, there have been significant moves in the reform of EU policy towards rural areas, the most significant of which was the reform of the Structural Funds in 1988, which resulted in the closer co-ordination of the activities of the Regional Fund, the Social Fund and elements of the structural component of the Agricultural Fund (Bryden and Commins, 1997; Midmore, 1997). The EU was divided up geographically, by sector or by occupational group into the so-called ‘Objective designations’ in which multi-annual programmes of EU-supported actions would take place. Large areas of disadvantaged rural Europe are covered by Objectives 1, 5b and 6, in which these programmes occur.

Under the 1988 procedures, the relevant national and regional authorities in these designated areas drew up a proposal or plan which was then subjected to scrutiny by representatives of

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2 Perhaps ‘forests are the primal birthplace of nations’ (Schama, 1995 p. 6).
the European Commission. Feedback from *ex ante* appraisal was given to the national bodies who then produced a final Community Support Framework for the area in question. Since 1993, this procedure has been streamlined, allowing for the production of a Single Programming Document which speeds up what has been described as ‘a rather bureaucratic three-stage process of negotiation’ (Allen, 1996). Two examples of these documents from the north of Scotland (Scottish Office, 1994a, 1994b) reveal a modest interest in the forest sector, with the Highlands and Islands document listing a number of indicative actions, among which some RDF-related actions are discernible.

The key point to emerge from these new developments in policy is that the EU policy-makers no longer have any real faith in the ability of productivist policies in agriculture to deliver enhanced well-being to rural areas as a whole. Recent commentators who have operated close to the heart of the Agriculture and Rural Development Directorate point to a need for redirection of spending, away from price support of farm products towards environmental grants and support for the rather nebulous area of ‘rural development’ (Buckwell, 1996).

The locally-based partnership approach is reflected in the LEADER (Liaisons entre actions pour le développement d’économie rurale) Initiative, an EU instrument which was established experimentally in 1990 and has now entered a second phase. LEADER projects are all in disadvantaged areas (Objective 1, 5b or 6) and their activities are based on a plan drawn up by a Local Action Group, which consists of different local actors (businesses, Enterprise Agencies, Local Authorities and others) who devise an innovative plan which is part-funded by the EU to deliver new styles of support to these designated areas. In a number of LEADER projects, forest management and processing have been significant features. However, despite the widespread enthusiasm for the LEADER approach, Midmore (1997) notes that ‘while the LEADER programme may be deemed a success on the basis of the remarkable diversity of local rural development actions that it initiated, networking and (more markedly) monitoring and evaluation were much less effective.’

In the debate about appropriate ways of supporting rural areas, there has been increased concern for *processes* (means) of development and rather less for the *product* or outcomes of development. This focus on processes of local involvement, empowerment and capacity building is seen as a means of ensuring that development is and remains community based and continues to address local needs (Francis and Henderson, 1992).

The final stage in the development of the alternative policy agenda for rural areas can be seen in the Cork Declaration of 1996. The Cork Declaration comprised a 10-point assertion of principles which included a demand for integrated approaches, rural diversification, more sustainable approaches and more subsidiarity. Although the Cork Declaration has been continuously promoted, not least by the articulate group of academic activists present at the Cork meeting, it has not been well received by many of the member states or by others in the EU, particularly the Agricultural Council. It remains to be seen whether it was a rhetorical letting-off of steam or a turning point in the development of a European Rural Policy.

This brief review of rural policy reveals that there have been marked shifts in thinking and a number of new initiatives at a national and EU level. The consensus is that the current primary-industry, subsidy-based, predominantly productivist support system (this is of course a simplification) is under threat and will eventually be replaced by a more devolved community based, bottom-up, multi-sectoral approach. At an EU level, agriculture has to date been the principal single industry recipient of support and the trend away from this is evident in the rapid growth of the Structural Funds and the relative stagnation of the agricultural funding.

There are a number of important questions raised by these actual and proposed changes in policy. In the context of the rise of interest in RDF, it can be seen that this is broadly congruent with many elements of the new rural development policy within the EU. However, not all the EU policies have been fully appraised and such appraisal as exists is ambivalent about the overall success (see Midmore, 1997). Consequently, if RDF is seeking support, it might be deemed desirable to effect an economic appraisal of its merits.
The economic rationale for policy for RDF

RDF has been actively promoted by pressure groups in Scotland and although occasionally figures have been offered regarding the number of jobs that could be created if a community were to acquire control of an area of forest, there is a general paucity of economic analysis. Given the appetite of public funding bodies, especially the Treasury, for economic analysis, it is surprising that the case has yet to be presented in economic terms.

The reasons for this lack of economic analysis are several. First, there is often a distaste for (or antagonism towards) economic analysis from community activists and environmentalists. Second, the activists may not have the skills or resources to deliver full economic analyses to potential supporters. Third, the economic evidence may simply not exist and the argument has to be presented on other (often more emotive) grounds. Fourth, the economic techniques may be insufficiently sophisticated to pick up the complex and multiple values associated with RDF, which encapsulate both efficiency and equity issues and a very wide range of uses of forests and forest products. Finally, there is a recognition that RDF needs to be considered from sociological, institutional and ecological perspectives as well as from an economic perspective.

However, in 1996, the Forestry Commission commissioned research from Aberdeen University to begin to explore these issues. In addition to examining attitudes of a wide range of inhabitants of remote rural communities to forest-related development, the study focused on the financial and economic appraisal of RDF. This paper focuses on the economic analysis of this research. Information on the aspirations of the case study communities and the activities of community-based initiatives were used to identify a set of RDF options. Typical examples of RDF were then constructed in particular geographical locations, with which conventional or ‘control’ forest systems could be compared. Finally, financial and economic criteria were selected in relation to which an evaluation of RDF and conventional forest practice could be conducted.

The control forest systems were chosen from two forest districts visited during the fieldwork and broadly represent the differences between commercial coniferous forestry in western and eastern parts of northern Britain. The systems were examined in the Forestry Commission’s FIAP financial model. The control forest systems used were the Wester Ross Forest District new planting model and the Inland Moray Forest District restocking model. These two models were chosen due to the significant variation between Wester Ross and Moray in climate, soil quality, forest operations and forest recreational uses. 3

For purposes of comparison, these systems were then adapted to three RDF systems capable of delivering the benefits desired, as identified by the communities visited.

Three options for RDF were defined and are described below:

1 Employment-centred rural development forestry (RDFa). This has as its main consideration the creation of jobs within the forest, linked to the creation of jobs through associated local supply and processing industries. Key elements of this option included the direct employment of local labour by the forest owner and the use of local contractors (for forest operations), the use of local supply and processing enterprises (e.g. tree nurseries, sawmills), and the adoption of small-scale work methods (including motor–manual felling). These are assumed to produce cost penalties, varying between 10 and 15 per cent, resulting from the need for, inter alia, training of local labour and costs of using low-tech, small-scale working methods. The species mix is used as for the control system.

2 Recreation- and amenity-centred rural development forestry (RDFb). This is centred around the provision of access and recreation, principally for the benefit of the local community, and is focused more on amenity than rural development. This option comprised an increased broadleaved component and greater conifer diversity (reduction in Sitka spruce, increase in larch, Scots pine and Douglas fir, and introduction of noble fir), more open

3 The Wester Ross model was based on a no-thin policy (due to the risk of windthrow) comprising 72 per cent Sitka spruce. The principal species in Moray, where soils were of better quality, were Scots pine (51 per cent) and Sitka spruce (34 per cent). Recreational use was considered to be substantially greater in Moray.
space, improved access, and more emphasis on conservation, including greater crop tending (e.g. brashing, pruning). Further costs were generated through the construction of car parks and footpaths.  

Combined employment and recreation/amenity rural development forestry (RDFc). This incorporates the provisions of both the employment generation and recreation/amenity options. (A potential conflict may arise with lower timber production resulting in fewer jobs. This may, however, be offset or exceeded by increased alternative jobs, such as rangering or increased maintenance.)

Financial returns
The financial appraisal was conducted using the Forestry Commission appraisal package FIAP. Baseline data for inputs into FIAP were provided by local forest districts in Moray and Wester Ross. The data comprised a breakdown of forest operations, detailing the percentage of the forest treated, the year(s) in the rotation in which the operations take place, and the current unit costs of operations per hectare per year. The revenue from timber was calculated using the Price Size Curve for conifers in Scotland in 1990/91.

Economic/external returns
The different forest system options are associated with a series of positive and negative externalities. Baumol et al. (1979) describe externalities as the ‘unintended side-effects’ associated with ‘economic activities that affect not only the welfare of the supplier and the purchaser of a product, but also (unintentionally) yield incidental benefits or cause incidental injuries to some third party or parties not directly involved in the exchange’. Pearce (1991) describes a range of externalities relating to forestry, including community integrity and biodiversity values, and more conventional external effects such as recreation and landscape values. The principal costs and benefits considered in this study were selected from this and other research (for example Hornung and Adamson, 1991; Willis and Benson, 1989; Willis and Garrod, 1992 – see page 3) and are given in Table 1.

Constraints of time and expenditure prohibited the direct calculation of these external benefits and costs. Relevant data were extracted from the literature. This was applied where possible, and adapted if necessary, to the control and RDF options.

Employment effects
The level of employment generated by each option was estimated by calculating the number of man-hours required per 1000 ha to perform individual forest operations. Local Forest Enterprise staff provided estimates of wage costs and work rates. Data were adapted, where necessary, for the RDF options. The local forest districts were also consulted on which operations were carried out by local (district) labour and on the additional man-hours that would be created through motor manual thinning and felling practices. The man-hour calculations were aggregated and expressed as full-time equivalent jobs (FTEs).

Tree nurseries and sawmills in northern Scotland

Table 1: Key positive and negative externalities associated with forestry operations

<table>
<thead>
<tr>
<th>Positive externalities</th>
<th>Negative externalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon sink</td>
<td>Loss of water volume</td>
</tr>
<tr>
<td>Recreation provision</td>
<td>Loss of water quality</td>
</tr>
<tr>
<td>Wildlife diversity</td>
<td>Landscape intrusion</td>
</tr>
<tr>
<td>Landscape enhancement</td>
<td>Wildlife loss</td>
</tr>
</tbody>
</table>

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5 It is recognized that the categories selected do not represent a comprehensive list (for example forests may have a role in flood control and reducing soil erosion) and further may be divided into sub-categories such as the number of wildlife habitats.

6 It was recognized that there might not be demand at a district-wide level for work practices involving motor–manual thinning and felling.
were contacted to provide approximations of the number of jobs supported by a given level of timber production. It was assumed that young trees would be planted at 2.0 metre spacing and Forestry Commission Yield Models were used to calculate the volume of timber produced per 1000 ha in Wester Ross and Moray districts (according to the control systems). Thus, estimates were made of the number of jobs supported by tree nurseries and sawmills per 1000 ha of forest. No data were gathered on employment in pulp-processing or board manufacture. Given the highly centralized nature of the industries, it was assumed that it would not be feasible to establish locally based pulp- or board-mills. Therefore, it was assumed that the pulp industry would not be suitable for adaptation to locally based forms of operation associated with RDF.

Results

Financial returns

With the exception of the Moray control and the RDFa systems at a 3 per cent discount rate, the control and RDF systems consistently generated a negative financial return. In general, there was a progressive deterioration in the financial returns as forest operations were adapted from the control system to RDFa, b and c. The results in this study are presented at an 8 per cent rate of discount. While this might be abnormal in forestry studies, it was explicitly requested by the Scottish Office as co-sponsors of this work, in order to enable comparisons with other possible investments in regional support. The financial returns foregone per hectare (the opportunity cost) of adapting the control systems to the RDF options were £137, £604 and £698 in Wester Ross, and £183, £497 and £617 in Moray (in terms of Net Present Value @ 8 per cent). The financial returns in the Wester Ross model were less than in Moray. This reflects poorer soil and climatic conditions which limit Yield Classes and reduced opportunities to extract thinnings (which would bring financial gains).

Economic returns

The economic analysis required the identification of the values of the non-market elements associated with the control and RDF systems. The literature search of externalities revealed that the only benefits with directly related comparables for the options considered were the carbon sequestration value and the recreation value (see Pearce, 1991; Whiteman, 1991 (unpublished)). Understandably, in remote rural areas with sparse populations, the recreation values are unlikely to be especially large. A complete social cost–benefit analysis would have taken account of shadow values for labour costs and of other externalities such as reduced water volume and quality. However, this was considered to be beyond the scope of this project.

Comparison of financial and economic returns

The financial and economic returns from the control and RDF options in Wester Ross and Moray are compared in Tables 2 and 3.

There is no difference between the non-market elements of the control system and RDFa, but there is a gain of approximately £50 per ha (in terms of NPV @ 8 per cent discount rates) in Wester Ross in relation to RDFb and RDFc, which reduces the effective economic loss but would still not lead the amenity-related options to be preferred on economic grounds. In Moray, the enhanced economic values under RDFb and RDFc were much greater at c. £440 per ha (in terms of NPV @ 8 per cent discount rates) but remained insufficient to displace the control system as the most profitable option.

The effect of varying the rate of discount is, as expected, to raise the forestry revenues at lower discount rates (see Tables 4 and 5).

Employment effects

All of the RDF options produce significantly greater levels of employment than the control forestry system (see Tables 6 and 7). This is due to the partial substitution of labour for machinery under RDFa and RDFc, additional labour for amenity provision and maintenance under RDFb and RDFc, and the use in all three RDF options of local labour for forest operations (where this is deemed possible). Employment gains were equivalent to approximately 0.5 full-time equivalents (FTEs) per 1000 ha under RDFb, between 1.0 and 1.5 FTEs per 1000 ha under RDFa, and in excess of 1.5 FTEs per 1000 ha under RDFc.
## Table 2: Financial and economic returns per hectare in terms of net present value for control and Rural Development Forestry (RDF) forest systems (at 8 per cent discount rate): Wester Ross

<table>
<thead>
<tr>
<th>Forest system</th>
<th>Financial value</th>
<th>Recreation (incl. wildlife)</th>
<th>Carbon sequestration</th>
<th>Economic value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>−1489</td>
<td>49</td>
<td>225</td>
<td>−1215</td>
</tr>
<tr>
<td>RDFa</td>
<td>−1626</td>
<td>49</td>
<td>225</td>
<td>−1352</td>
</tr>
<tr>
<td>RDFb</td>
<td>−2093</td>
<td>148</td>
<td>180</td>
<td>−1765</td>
</tr>
<tr>
<td>RDFc</td>
<td>−2187</td>
<td>148</td>
<td>180</td>
<td>−1859</td>
</tr>
</tbody>
</table>

### Table 3: Financial and economic returns per hectare in terms of net present value for control and Rural Development Forestry (RDF) forest systems (at 8 per cent discount rate): Moray

<table>
<thead>
<tr>
<th>Forest system</th>
<th>Financial value</th>
<th>Recreation (incl. wildlife)</th>
<th>Carbon sequestration</th>
<th>Economic value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>−1172</td>
<td>223</td>
<td>196</td>
<td>−753</td>
</tr>
<tr>
<td>RDFa</td>
<td>−1355</td>
<td>223</td>
<td>196</td>
<td>−936</td>
</tr>
<tr>
<td>RDFb</td>
<td>−1669</td>
<td>668</td>
<td>186</td>
<td>−815</td>
</tr>
<tr>
<td>RDFc</td>
<td>−1789</td>
<td>668</td>
<td>186</td>
<td>−935</td>
</tr>
</tbody>
</table>

All carbon sequestration values used in the Tables 2 and 3 are adapted from Pearce (1991) who used a 6 per cent discount rate. All other values used (financial, recreation and wildlife values) are calculated at 8 per cent.

## Table 4: Effect of varying discount rates on control and Rural Development Forestry (RDF) options: Wester Ross

<table>
<thead>
<tr>
<th>Discount rate (%)</th>
<th>Control</th>
<th>RDFa</th>
<th>RDFb</th>
<th>RDFc</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>−18</td>
<td>−399</td>
<td>−1739</td>
<td>−2054</td>
</tr>
<tr>
<td>4</td>
<td>−677</td>
<td>−1005</td>
<td>−2009</td>
<td>−2245</td>
</tr>
<tr>
<td>5</td>
<td>−1116</td>
<td>−1331</td>
<td>−2117</td>
<td>−2289</td>
</tr>
<tr>
<td>6</td>
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<td>−2237</td>
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<tr>
<td>8</td>
<td>−1489</td>
<td>−1626</td>
<td>−2093</td>
<td>−2187</td>
</tr>
</tbody>
</table>

Note: The stand average is based on the same planting model applied to each species, where the proportion of the different species making up the productive component is as follows:
Control: Sitka spruce 72 per cent, Scots pine 9 per cent, Japanese larch 8 per cent, Douglas fir 11 per cent.

## Table 5: Effect of varying discount rates on control and Rural Development Forestry (RDF) options: Moray

<table>
<thead>
<tr>
<th>Discount rate (%)</th>
<th>Control</th>
<th>RDFa</th>
<th>RDFb</th>
<th>RDFc</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>825</td>
<td>381</td>
<td>−558</td>
<td>−1116</td>
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<td>4</td>
<td>−60</td>
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<tr>
<td>5</td>
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<td>−1789</td>
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</table>

Note: The stand average is based on the same planting model applied to each species, where the proportion of the different species making up the productive component is as follows:
Control: Sitka spruce 34 per cent, Scots pine 51 per cent, European larch 3 per cent, lodgepole pine 12 per cent.
Cost of employment

In considering their effects on local employment, the RDF options can be regarded as tools of local economic development. In this context, it is useful to consider the cost of creating employment through RDF. This can be achieved by using the results relating to financial and economic values and employment creation under the different options. Economic values associated with carbon sequestration, recreation and wildlife have been assumed to be the same in both the control and RDFa options. Thus, the cost of generating employment through RDFa (compared with the control system) is a financial cost and at a discount rate of 8 per cent is approximately £80 000 per local FTE in Wester Ross and approximately £95 000 per local FTE in Moray. If other jobs were created locally as a result of this injection of local income, it could be argued that the costs of job creation in these disadvantaged areas would be reduced, but this cost seems enormous when considered against the costs of job creation by other local development activities.

Discussion

This financial and economic analysis suggests that RDF cannot be supported in the case study environments unambiguously on either financial or economic grounds. This apparently poor performance needs to be explained. First, it is possible that the above models do not contain all the components of value in the RDF alternative, or that the estimates of the variables are not accurate. Second, it is possible that different forms of economic analysis, beyond the scope of the study described, would reveal different conclusions.

The financial models of the RDF and the control comprise the standard FIAP approach. Such an approach inevitably emphasizes the market outputs rather than the non-market benefits and it pays no heed to local multiplier effects of different actions. Further, it is evident that whether the discount rate used is 8 per cent or 3 per cent neither conventional forestry nor RDF strategies performs well, although the Moray control generates a positive NPV at a 3 per cent discount rate.

The acceptance of low discount rates on forestry can be seen as a very blunt instrument with which to defend forestry. As was evident in the discussions with case study communities, different communities may wish to derive different benefits from forests and a more participatory approach may yield evidence of a wider range of community interests and values. The non-market values included in the above results are based on earlier studies and not local estimates. It is not
clear whether local data would have resulted in higher estimates, but such an assertion is plausible, especially in the situation where consultation reveals non-market preferences, which are then provided for in subsequent actions.

The economic analysis of RDF was based on investment appraisal rather than an analysis of local economic activity. This approach can be used to guide allocative decisions on particular areas of land. Such results are inevitably sensitive to land values, and changes in the Common Agricultural Policy may reduce farmland values and enhance the economic prospects for tree planting adjacent to rural communities. The economic prospects for forestry may thus be anticipated to fall as land values drop in the light of current difficulties in the farm sector and anticipated pressures arising from Millennium round World Trade Organization talks.

However, an analysis of local economies may result in a different set of conclusions, in that local (knock-on) multiplier effects may be higher under RDF options. This conclusion can be anticipated from the evidence of more local employment in the RDF models and would be likely to be compounded if local inputs were used and local processing took place. However, it is still important to consider the cost of forestry job creation against the next best alternative, and it would appear from the above analysis that job creation through RDF is rather costly.

These results should be seen as a contribution to two debates: one about styles of forestry and their financial and economic merits; the other about styles of development. The advocacy of new styles of forestry does require economic analysis. To date the economic analysis of RDF indicates that the case for it is not proven. However, more refined economic analysis, currently being undertaken at Aberdeen may throw further light on this. The compatibility of RDF with new approaches to development, reveals that the activist promoters of RDF have been able to obtain succour from evidence of the adoption of more participatory styles of resource-based development by leading government agencies and NGOs. At times, the appraisal of RDF has been considered in overtly political terms and the re-emergence of land reform on the Scottish political agenda means that the wider political context cannot be ignored.

There is now a recognition that forestry policy has become more multi-purpose. As forest practice adapts to these demands there will inevitably be tensions and conflicts. It is important that such conflicts should be informed by economic analysis as part of an evaluation of the options. To date, it would seem that the justification of RDF on allocative efficiency grounds is somewhat difficult, although enhanced non-market values go a substantial way to narrowing the gap between conventional and RDF options. However, wider economic arguments relating to local or regional specific benefits and other sociopolitical arguments are likely to mean the continued promotion of RDF. The key forestry institutions, which in the past might have been passive (or even concerned) observers of the development of RDF, have now become much more involved in its promotion. As the richness of ideas in RDF receive greater attention and as the capacity of local communities and partnership bodies to get involved in local forest-related development is enhanced, it can be anticipated that, in some areas, new economically viable forms of RDF will emerge to make a contribution to rural development in Scottish rural communities.

Acknowledgements

The authors would like to thank Gill M. Clark and Dugald Foreman, two other members of the research team, for their contributions to the project and Professor Ken Thomson and an anonymous reviewer for his comments on the paper.

References


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Conference of the Agricultural Economics Society, Edinburgh.

Received 18 April 1997