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# The impact of landscape design planning on the timber production and financial outputs of a forest plantation in Ireland

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## Abstract

Significant expansion has occurred in Ireland's forest estate since the 1950s. However, the design of the monocultural plantations established in the 1950s and 60s is now considered insensitive to local landscapes and re-design intervention and transformation is needed to improve integration into the environment. This case study was carried out in Laracus forest, Co. Donegal. The rotation of all stands in this 581-ha property has reached the final production phase, with coupes scheduled for clearfelling from 2003 to 2015. The implications of forest re-design for both the volume production in the current rotation and the financial return of the current and subsequent rotations were examined. Results indicated a volume loss due to design planning for the current rotation of 5.6% compared to the volume produced under the standard regime. In financial terms, this represents a loss of 4.6%. For the subsequent rotation, a significant financial gain of 22% in net present value was achieved as a result of redesigning the plantation. The overall financial out-turn for the property, when both the current and subsequent rotations were considered, was a 3.4% lower net present value for the design plan than for the standard regime. This result represents a lower impact of design planning in Laracus than most other forest restructuring studies have reported. © 2001 Elsevier Science B.V. All rights reserved.

*Keywords:* Forest landscape design; Forest transformation; Sustainable development; Economic analysis; Timber production

## 1. Introduction

The original forests in Ireland were decimated during the last three centuries (Mitchell, 1976).

An effort to restore a forest resource was initiated in the late 1940s. The programme of afforestation had the objective of meeting employment needs, coupled with a positive financial return on the investment (Ní Dhubhain, 1995). Expansion was largely confined to marginal land in remote areas, safeguarding fertile land for agricultural production. During the 1960s and 70s, the afforestation programme continued and size-

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able tracks of remote hills and farmsteads were afforested, mainly with monocultures of Sitka spruce [*Picea sitchensis* (Bong.) Carr.] and Lodgepole pine (*Pinus contorta* Douglas ex Loud). The sole objective for these forests was wood production and the impact on the landscape was not seriously taken into account (Farrell, 1997).

Today, however, there are strong demands to reduce the negative visual impact of forest plantations and to integrate them with their surrounding environment (Price, 1997). Many landscapes have been designated as sensitive, and landscape aesthetics have become a significant influence on the planning, location and design of plantations. In addition, the demands of sustainable forest management and forest certification require the incorporation of a variety of social and environmental values into forest practices (Anon., 2000). At the same time, however, maintaining economic viability is a vital primary requirement for both the forest owners and the wood processing industry.

Forest blocks for which specific environmental or landscape sensitivities have been identified require a transformation process. The felling plan and reforestation proposal are the route to changing management from a purely production orientation to a multi-objective and sustainable regime. An assessment of the implications for timber production during the restructuring phase should be an integral part of this transformation process. The extent to which production is lost during transformation and to which profitability is reduced in current and future rotations needs to be evaluated. This type of detailed quantitative analysis can only be carried out on a case-study basis. Forest properties with obvious landscape sensitivities, and in which the majority of stands is approaching clearfelling, are obviously the most in need of such an analysis. This article reports on the results of a case study carried out on Laracus property, Letterkenny Forest, Co. Donegal. A landscape design plan was drawn up for the property and the implications of re-design for scheduled timber production and economic returns during the transition phase, as well as for the subsequent rotation, were assessed.

## 2. Literature review

### 2.1. *Forest plantations and the landscape*

Many authors on forest design have stressed the need to seize the opportunity that clearfelling offers to rectify plantation shape and to enhance diversity. Crowe (1978) suggested that felling programmes provide an opportunity to improve landscape features previously lost. Lucas (1991) considered that harvesting and reforestation have the potential to remedy many of the errors made in the initial design of forests. Bell (1993) took the view that forests in upland Britain, which were planted following World War I, looked ‘awkward’, were ‘artificial,’ and ‘out of place’ and needed re-design. In Ireland, it has also been recognised that increased diversity and improved design should be an important objective of restocking in conifer plantations (Anon., 1998a). Conifer plantations have effected the most marked transformation on the Irish landscape this century (McCormack and O’Leary, 1997) and large-scale afforestation has altered the character of the landscape in a controversial way (Clinch, 1998). Social attitudes and the views of ecologists, conservationists, fishery managers and other specialists have converged in criticism of exotic conifers, especially if grown densely along watercourse margins (Anon., 1997).

### 2.2. *Landscape planning*

Over time, guidelines have been developed on landscape management and design (Anon., 2000). Although primarily concerned with new afforestation, their essential values may be incorporated into reforestation design (Anon., 1998a). Crowe (1978) stressed the need to take account of all the felling coupes due in a forest block in reshaping the forest design. In some instances, detailed guidance will be required to address difficult aesthetic problems, both at national and regional level (McCormack et al., 1998).

In afforestation (and reforestation) developments, full compliance with Forest Service guidelines, including guidelines on Forestry and Water

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