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A Cluster based approach for identifying farm forest resources to maximize potential markets



Key external stakeholders:

COFORD, Council for Forest Research and Development
Forest Service, Department of Agriculture, Food and Marine
Teagasc Forestry Producer Groups
Forestry Companies and Stakeholders

Practical implications for stakeholders:

- The potential of Geographic Information Systems (GIS) as a tool to derive forest clusters has succeeded in identifying large geographic concentrations of private forestry in Ireland.
- GIS technology can assist in the rapid cost-effective assessment of timber resources
- Forest clusters provide many advantages for small scale forestry including provision of economies of scale, in supply, reduced costs and increased competitiveness of the private forest sector.
- Such concentrations of forests and growers may enable the establishment of Forestry producer groups within defined geographic locations, and enabling a more targeted knowledge transfer and extension service.

Main results:

A GIS based cluster analysis of private forestry in Ireland succeeded in locating 16 forest clusters greater than 10,000 hectares. The sixteen cluster areas contain 88,000 hectares (Table 1). A survey to examine the potential timber supply and constraints of private forestry was undertaken in one forest cluster near Ballaghaderreen in Co. Roscommon. The use of GIS methods and field survey data enabled a rapid assessment of forest resources to be performed. The methodology employed offers a cost-effective solution to the assessment of private forest resources which could be used to assess national wood supply targets.

Opportunity / Benefit:

This research has demonstrated a cost-effective solution to the assessment of private forest resources. Significant opportunities for developing a local forestry infrastructure, using innovative solutions to identify forestry resources, presents economies of scale and scope, indicating that there are grounds for co-production and integration of harvesting activities. Secondly, the boundaries or extent of a cluster, also present opportunities exists to pool resources from geographic concentrations of farm forest plantations and knowledge gained thus optimising the value of first thinning.

Collaborating Institutions:

None

Teagasc project team: Dr. Niall Farrelly (PI)
Mr Brian Clifford
Mr Stuart Green

External collaborators: None

1. Project background:

The project aimed to quantify the potential of clustering as a technique suited for identifying geographic concentrations of private forest plantations approaching first thinning, specifically to address the following issues:

1. Quantification of the resource
2. Identifying markets for produce
3. Creating economies of scale
4. Reducing the costs associated with harvesting
5. location of potential end users close to the resource
6. Creation of harvest and forecasting schedules for cluster areas

2. Questions addressed by the project:

- Allows identification of large concentrations of private forestry in defined geographic locations with significant harvest potential
- It provides a cost effective methodology for assessing private forest resources
- It allows a rapid assessment of thinning potential in local defined areas.
- It provides a methodology for the establishment of forest grower 'producer groups' who may wish to collaborate in the sale and harvesting of forest products and in the grouping of forest operations together to achieve economies of scale.

3. The experimental studies:

All private forests in receipt of grant aid in Ireland were identified from a spatial database provided by the Forest Service, Department of Agriculture, Food and Fisheries. We performed a GIS cluster analysis which identified 16 national forest clusters. A cluster study area was chosen in the counties of Mayo, Sligo and Roscommon. Within the study area, we developed a forest inventory database covering 4,597 ha using remote sensing technologies (including LIDAR) together with a detailed field survey. A sample survey of 92 forest owners was conducted covering 932 ha to compile forest growth data. We simulated various management regime practices on forests using growth data and windthrow risk. This allowed a forecast of production from c. 5,000 ha covering the period 2009 – 2028.

4. Main results:

The GIS based cluster analysis succeeded in locating 16 forest clusters occupying 88,000 hectares. The use of a cost-effective solution to assessing private forest resources was in one forest cluster near Ballaghaderreen in Co. Roscommon enabled c. 5,000 ha of forest to be identified which offered a realistic thinning potential. A follow up ground survey indicated that although average individual plantation sizes were small (5.14 ha - 47% were less than 8 ha), the majority of stands assessed had good public road access, a key factor influencing the availability of forest thinnings. In fact thinning has been carried out in 30% of the forest area examined but is confined solely to productive forests. These forests are predominately pure stands of Sitka spruce, where exceptional yields ($>24\text{m}^3 \text{ha}^{-1} \text{yr}^{-1}$) of on difficult to farm wet mineral soils offer short term harvest potential. The species accounts for 75% of the area and 90% of the total standing volume ($754,146 \text{m}^3$) and stands are suitable for thinning on average at 14 years of age. Total standing volume for a cluster of c. 4,500 ha is $840,698 \text{m}^3$ with $365,990 \text{m}^3$ available as small sawlog, $324,796 \text{m}^3$ as pulp and $149,913 \text{m}^3$ as large sawlog. These results indicate the significant potential of farm forestry to meeting local and national supply targets.

Table 1: The location of forest clusters, forest area and forest cover in percent. Study area is highlighted in bold.

No.	Location	Forest area (ha)	Cluster Area (ha)	Forest as % of Cluster
1	Limerick, Kerry, Cork	28,400	296,314	10%
2	Galway, Limerick, Tipperary	13,455	163,220	8%
3	Mayo, Sligo, Roscommon	9,576	130,409	7%
4	Leitrim, Sligo, Cavan	8,901	105,277	8%
5	Clare	8,922	80,825	11%
6	Donegal	4,287	54,044	8%
7	Westmeath, Laois	3,506	48,646	7%
8	Kilkenny, Laois	2,041	26,474	8%
9	Donegal	2,219	22,569	10%
10	Mayo	1,440	18,184	8%
11	Waterford, Tipperary	1,104	13,753	8%
12	Donegal	1,200	12,477	10%
13	Longford, Westmeath	768	10,991	7%
14	Wicklow	715	10,896	7%
15	Cork	881	10,893	8%
16	Mayo	728	10,593	7%
	Total Area	88,143	1,015,565	

5. Opportunity/Benefit:

Significant opportunities exist with which to accelerate timber output from small-scale forest plantations through clustering the geographic concentrations of forests. The primary stakeholder for this research is COFORD and Government policy makers, who can use information to formulate policy regarding the supply of raw material from the private forestry sector in order to meet timber forecasts and renewable energy targets. The benefits of the project are already being realised in the setting up of forestry producer groups throughout the country. The study has provided a template for assessing forest resources. It is hoped it may facilitate local cooperation between growers and industry to achieve economies of scale in harvesting.

6. Dissemination:

Farrelly, N. 2008. Fuelling Your Future – The Growing Forest Resource. Proceedings from the Teagasc/COFORD/SEI Wood Energy Conference, Westport 10 September 2008.
 Clifford, B., Green, S. and Farrelly, N. 2008. A cluster-based approach for the identification of private forest resources. 2nd Annual Irish Earth Observation Symposium, Cork, 6-7 November 2008.
 Clifford, B. 2009. A cluster-based approach for identifying thinning material for wood energy users. Proceedings from the Teagasc/COFORD/SEI Wood Energy Conference, Wednesday 17 June 2009, Kilkenny.
 Farrelly, N. and Clifford, B. The Potential of Cluster Analysis to aid the Private Forest Sector in Ireland. National Forestry Producer Group Conference, September 9, 2009.

Main publications:

Farrelly, N., Clifford, B. and Green, S. 2008. Unlocking Farm Forest Potential. TRResearch 3 (1): 22-25.
 Farrelly, N., Clifford, B. and Green, S. 2008. Using GIS Cluster Analysis to Quantify Timber Production from farm forestry plantations. Irish Timber and Forestry 17 (5): 30-33.
 Farrelly, N. and Clifford, B. 2010b. A preliminary evaluation of the application of multi-return LiDAR for forestry in Ireland. COFORD Connects Research Communication.

Popular publications:

Farrelly, N., Clifford, B. and Green, S. 2008. Forest Focus Unlocking Farm Forestry. Irish Farmers Monthly July 2008. p42-44.

7. Compiled by: Niall Farrelly