

## CRITERION 1

### MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

The forest estate in Ireland has increased steadily over the past 50 years. This has been due to the afforestation of agricultural land. Government policy, as set out in *Growing for the Future*, is that the forest estate should continue to expand at a rate of 20,000 ha per annum to the year 2030.

Given that Irish forests are generally young and fast growing and that new land is planted each year, the potential of Ireland's forest estate to sequester carbon is quite high.

The indicators for this criterion are:

**Indicator 1.1: Policy, legislation and support measures**

**Indicator 1.2: The forest resource and land conversion**

**Indicator 1.3: Forest ecosystem carbon budgets**

**Indicator 1.4: Forest industry carbon budgets**

Quality planting and management are the basis for the maintenance and expansion of Ireland's national forest estate, enabling it to fulfil its wide range of wood and non-wood functions, including carbon sequestration.



### Indicator 1.1: Policy, legislation and support measures



Tree felling and reforestation are controlled by the Forest Service of the Department of the Marine and Natural Resources under the Forestry Act 1946. This Act is currently being revised. The Forest Service also administers forest grant and premium schemes and downstream support measures. It is responsible for relations with the European Commission and implements international agreements relating to forestry.

#### *Measures*

- 1.1.1 Existence of policies and review mechanisms which enhance and maintain forest resources.
- 1.1.2 Evidence of the existence of forest policies which facilitate compliance with international commitments in relation to greenhouse gas emissions.
- 1.1.3 The extent of compliance with requirements relating to international greenhouse gas emissions.
- 1.1.4 The existence of a legal and regulatory framework which ensures, maintains and enhances forest resources.
- 1.1.5 The existence of a legal and regulatory framework which provides the capacity to review and amend forest policy.
- 1.1.6 Existence of financial incentives to establish, maintain and improve forests.
- 1.1.7 Existence of financial incentives to encourage the establishment of plantations.
- 1.1.8 Evidence for the compatibility of incentives for alternative landuses.
- 1.1.9 Existence of information systems which can provide for continuous qualitative and quantitative maintenance of the forest resource and the production of appropriate and reliable statistics.
- 1.1.10 Evidence of a capacity to produce national and regional forest plans and strategies.

### Indicator 1.2: The forest resource and land conversion

Forests account for 9% of Ireland's land surface. This is low by European standards. The national objective is to have 17% of the land area under forestry. This is to be achieved on a voluntary basis and encouraged by the provision of financial incentives. Afforestation is currently increasing the resource by 12,000-20,000 ha per annum. To date, the loss of forest to developments such as roads and urban encroachment has been small.

#### *Measures*

- 1.2.1 At national level, measures to be assessed by successive inventories and by statistics from incentive programmes to include:
  - area of land converted to forestry;
  - area of land permanently taken out of forestry.
- 1.2.2 At forest level, this indicator can be quantified from:

- planting records;
- management records;
- maps.

### Indicator 1.3: Forest ecosystem carbon budgets

Carbon sequestration in forest ecosystems contributes to a reduction in the concentration of greenhouse gases in the atmosphere. Carbon is retained for long periods

in the forest biomass and soils, and later as wood products. Ireland has signed the Kyoto Protocol to the UN Framework Convention on Climate Change. The target is to confine emissions of greenhouse gases at 1990 +13% levels during the period 2008-2012. Increased forest cover and tree vigour can make a significant contribution towards mitigating the impact of emissions from other sectors of industry. As the current forest estate is relatively young, it is estimated to be accumulating about 1.7 million tonnes of carbon per annum. However, new land must be continually planted in order to achieve net short-term and long-term carbon sequestration.

#### Measures

1.3.1 At a national level, this indicator may be measured by:

- establishing the total carbon storage in the national forest estate;
- monitoring the accumulation of carbon in forest biomass and soil;
- investigating the mechanisms of carbon storage and decay in forest ecosystems;
- seeking evidence of flexibility in forest management which permits long-term retention of forest stands;
- inventory data of the national area devoted to fuelwood and biomass production;
- evidence of research into alternative wood energy systems.

1.3.2 At a local level, this indicator can be measured from:

- evidence that forest operations are carried out in a manner which is favourable to long-term carbon storage; e.g. minimal ground surface disturbance;
- forest records showing long-term retention of stands;
- extent of energy plantations and use of forest residues and thinnings in energy generation.

### Indicator 1.4: Forest industry carbon budgets

Most forest operations have become mechanised and the level of forestry-related industrial activity has increased. The energy source for most forestry equipment is derived from fossil fuel. However, many sawmills and other wood-processing industries rely on wood waste for part of their energy requirement. The decay rates of forest products and the release of CO<sub>2</sub> also influence industry carbon budgets.

#### Measures

1.4.1 National measures for this indicator are:

- the total carbon store in forest products;
- evidence of research in life-cycle analysis;
- greenhouse gas emissions by the forest industry;
- evidence for the use of wood waste, other biofuels, or alternative energy systems in the forest industry;
- degree of recycling of forest products.

1.4.2 At an individual industry or local level, appropriate measures are:

- evidence of measures to enhance the life of forest products;



## CRITERION 2

### MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

In a forest, the health and vitality of the dominant vegetation - the tree cover - reflect the condition of the ecosystem as a whole and its ability to sustain production into the future. While it may arise for diverse reasons, deterioration in forest health provides a warning signal which merits investigation. If deterioration is the result of some transitory influence, then it may give no cause for concern. However, if it is a response to deterioration in soil conditions or to some biotic or abiotic external influence, then it may indicate a long-term threat to the sustainability of the ecosystem.

The indicators for this criterion are:

**Indicator 2.1: Policy, legislation and support measures**

**Indicator 2.2: Defoliation of forests**

**Indicator 2.3: Damage caused by biotic and abiotic agents**

**Indicator 2.4: Beneficial influence of biotic agents and ecosystem processes**

**Indicator 2.5: Changes in physical and chemical properties of soils**

Essential research on forest ecosystem health and vitality in Ireland is funded by the Forest Service and COFORD.





### Indicator 2.1: Policy, legislation and support measures

Two EU regulations translated into Irish law deal with most of the policy and legislation concerning forest ecosystem health and vitality. Regulation EEC 3528/86, arising from the Strasbourg Ministerial Conference on the Protection of Forests in Europe, has led to the establishment of a Europe-wide network of forest condition monitoring plots. Council Directive 77/93/EEC, commonly referred to as the Plant Health Directive, deals with protective measures against the introduction into the Community of organisms harmful to plants or plant products. The burning of vegetation close to forests is controlled under the Wildlife Act 1976.

#### Measures

- 2.1.1 Existence of policies, review mechanisms and a legal framework which facilitate the monitoring of ecosystem condition and vitality in accordance with international agreements.
- 2.1.2 The extent of compliance with requirements in relation to the monitoring of forest ecosystem condition and vitality.
- 2.1.3 Evidence of the existence of adequate research and information systems which can provide for reliable quantitative monitoring of forest condition and vitality.
- 2.1.4 Effectiveness of control systems to prevent the import of organisms harmful to forests.
- 2.1.5 The capacity to anticipate and respond to threats to forest ecosystem health and vitality, e.g. contingency plans, fire plans, reconstitution grants.

### Indicator 2.2: Defoliation of forests

This indicator is catered for nationally by the existing United Nations/Economic Commission for Europe (UN/ECE) network of forest health plots. The condition of trees in this network of permanent sample plots is monitored on an annual basis.

#### Measures

The programme has two monitoring intensities.

- 2.2.1 At a national level, monitoring of defoliation is as follows:
- in Level I plots, forest health is monitored; in Level II plots, the emphasis is on understanding the underlying causes of changes in forest health and vitality;
  - forest health and vitality is measured using the UN/ECE and EU defoliation classification, and is monitored through the structures established under the UN/ECE and EU programmes;
  - annual reports are published.
- 2.2.2 At a local level, defoliation is measured by assessment of Level I and Level II plots according to their location.

### Indicator 2.3: Damage caused by biotic and abiotic agents

Due to its island status and isolated geographic location, Ireland is uniquely protected against exotic pests and diseases. The entire island is designated by the EU as one region for plant health purposes. Under EU plant health regulations, an inspection system is operated in order to monitor imports of forest reproductive material and to ensure that wood imported is free of bark. The Forest Service has published contingency plans to be followed in the event of serious attack by insect or fungal pest. Under the EU Plant Health Directive, strict regulatory controls are in place to protect Ireland's forests.

Abiotic agents such as wind, fire and frost, may occasionally cause severe damage to forest ecosystems. Some exceptionally damaging storms have occurred in recent years, while fires destroy approximately 200 ha of forest per annum. However, in general terms, biotic and abiotic agents cause little permanent disturbance in most Irish forests.

#### *Measures*

2.3.1 At national level, disturbance to forest ecosystems by biotic and abiotic agents is

recorded through:

- GIS-based inventory systems and effective national reporting compiled management records;
- research studies, information and statistics relating to trends in, *inter alia*, climate, air quality and soil properties.

2.3.2 At local level, this type of damage may be recorded in forest plans and periodic assessments on the ground. Measures to be recorded should

- evidence of the existence of new pests and diseases;
- area of forest and other wooded area damaged by insects and the degree of damage;
- estimates of the volume and value of wood lost through decay;
- area of forest and other wooded areas damaged by fire;
- area of forest and other wooded areas damaged by storms;
- area of forest and other wooded areas damaged by wild and domestic animals;
- area of forest and other wooded areas damaged by air pollution (point source).

### **Indicator 2.4: Beneficial influence of biotic agents and ecosystem processes**

Mycorrhizal fungi and decomposer micro-organisms play an important role in maintaining the health and vitality of forest ecosystems. There is evidence that mycorrhizal associations may short-circuit nitrogen cycling, may act as biocontrol agents against soil-borne pathogens, and may protect trees from pollution damage. Symbiotic associations may be important under conditions of low nitrogen availability. Research is required into these micro-organisms and the manner in which they may benefit forest ecosystems.

Many biological processes are essential to the health and vitality of forest ecosystems. The rate at which litter and other biomass decomposes and at which nutrients are recycled are vital, as it is critical that trees have an adequate supply of nutrients in order to function efficiently as a living system. More research will be necessary before these cycles are fully understood.

#### *Measures*

2.4.1 At a national level, the impact of these organisms can only be assessed through research programmes and field trials.



### CRITERION 3

#### MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

The sustainable development concept links the environmental, the social and the productive functions of forests. To ensure that reserves are conserved while still maintaining a satisfactory flow of products, harvesting must not exceed long-term productive capacity. At the same time, a competitive climate must be maintained to ensure the flow of investment to forestry and to forest industries. The latter is an essential component of sustainable employment and income creation.

The indicators for this criterion are:

**Indicator 3.1: Policy, legislation and support measures**

**Indicator 3.2: Productive capacity**

**Indicator 3.3: Competitiveness of forest industries**

**Indicator 3.4: Contribution to the national and local economy**

**Indicator 3.5: Non-wood values**

Quality wood production supports Irish industry and employment, and is an important component of sustainable forest management.

