# Economic Appraisal of Forest Policy

# C O N T E N T S

## ANNEXES

## Executive Summary

### Introduction.

The economic appraisal examines the options for forest policy in Northern Ireland. It takes account of preferences expressed in the responses to the consultation paper "Forestry in Northern Ireland" published in June 2002. The appraisal was undertaken by the Forest Service in accordance with current guidelines set out in "The Green Book" published by HM Treasury 1999 and "The NI Preface to the Green Book" published by DFP, 1997.

### Background.

Forests in Northern Ireland cover about 6% of our land area. Eighty per cent of forests are state owned and managed by the Forest Service, and half of this lies in counties Tyrone and Fermanagh. They produce timber, contribute to improving and protecting the environment, and are a principal means of public access to the countryside.

The continuing management of existing forests costs £10 million annually. About half the expenditure aims at economic objectives, one fifth at social objectives and the balance aims to protect and enhance the environment. The net annual costs are £5 million, excluding capital charges. Three million is spend on forest expansion and regulation.

Domestic forest policy is strongly driven by internationally agreed statements and agreements to manage forests sustainably. The Executive's draft Programme for Government (September 2002) and the Government's Publication "Building on Progress, Priority and Plans for 2003-2006" underline the importance of integrating the principles of sustainable development in the rural and urban economy, of which forestry is part. In addition, the gradual expansion of forests is a contribution to global strategies on climate change. Powers for forestry development in Northern Ireland are contained primarily in the Forestry Act (Northern Ireland) 1953 which places responsibility for forestry on the Department of Agriculture and Rural Development.

### Need for a forestry programme

The need for government intervention in the forestry sector stems from insufficient private sector investment in forests. As a consequence there are insufficient opportunities for regional

development in rural areas, for public access to the countryside, and for protection and conservation of the countryside. In addition, government acknowledges the concerns of farmers that some land under agriculture might have greater value under forest, and recognises the difficulties farmers and others have in investing in long term projects with no prospect of a return for very many years. Government also recognises that other public policies designed to meet agricultural, environmental and social needs severely distort the allocation of land to any particular use, including that of forestry. Finally, the government is concerned to reduce the national demand for energy from fossil fuels as a contribution to alleviating the problems of climate change, and has indicated some willingness to meet the additional costs incurred by sectors such as forestry in achieving this objective.

**Current deficiencies.**

The main deficiencies are:

- lack of economic sustainability in the forestry sector,
- lack of trees in Northern Ireland,
- lack of opportunity and encouragement for access to forests for exercise and recreation; and
- insufficient encouragement for farmers and other landowners to diversify from agriculture into forestry.

The appraisal suggests objectives which meet these deficiencies. These are –

- to at least maintain the value added capacity of existing forests to sustain stable levels of industrial activity in the NI forestry and wood processing sector between 2003/04 and 2014/2015, and make provision for the years following.
- to improve the contribution which forests make to the quality of the environment.
- to increase the contribution that forests make to social welfare through access to forests for recreational and health giving exercise and for academic and social development.
- to encourage the transfer of up to 1% of land (20,000ha) from agricultural use to forestry by 2015.

**The options**

The appraisal examines a total of 16 options against the base case option of maintaining the existing range and balance of outputs. The options are limited by the amount of public finance available for forestry and were constructed to examine the effect on forestry output by varying the amount of public finance available.

**Options 1-5 examine the effect of reducing the annual net cost of forestry by up to £5 million. They are-**

1. Achieve no net cost of forestry by ceasing activity on restocking plantations, by withdrawing non-commercial access, and reducing maintenance.
2. Reduce expenditure by £2 million on restocking and maintaining forests.
3. Reduce timber production by 33%.
4. Withdraw public access to forests.
5. Reduce activity on protecting the environment to the minimum needed to comply with legal obligations.

**Options 6-9 examine the effect of increasing annual expenditure on forests by £2 million. They are-**

6. Expand timber production by 25%.
7. Improve tourist facilities.
8. Improve public access outside tourist areas.
9. Increase the environmental outputs of forestry.

**Options10-16 examine the effect of expanding forests at a cost of £3-£5 million. They are-**

10. Maintain the current rate and nature of forest expansion.
11. Maintain the current rate of forest expansion but increase the emphasis on creating a timber resource.
12. Double the rate of expansion to create a timber resource.
13. Maintain the current rate of expansion, but change the emphasis to improve public access to forests in the countryside and urban areas.

14. Improve biodiversity.
15. Promote integration of agriculture and farming through the practice of agro-forestry.
16. Create a wood fuel resource.

**Results**

The discounted costs and benefits of the base case and the 16 options over the life of a typical plantation of 40 years are shown below. The results are tested against a discount rate of 6% and 3.5%.

**Options: Net present benefit (cost) of forestry and wood processing, £ million.**

| Option | Discount Rate 6% | Discount Rate 3.5% |
|---|---|---|
| **Existing Forests Base Case** | 144 | 251 |
| 1.No Net Cost | 216 | 353 |
| 2.Reduced Maintenance | 175 | 294 |
| 3.Reduced Production | 175 | 294 |
| 4.Reduced Access | 150 | 258 |
| 5.Reduced Care | 146 | 253 |
| 6.Increased Production | 118 | 214 |
| 7.Increased Tourism Provision | 111 | 207 |
| 8.Improved Access | 111 | 203 |
| 9.Environmental Enhancement | 111 | 204 |
| **Forest Expansion** | | |
| 10.Existing rate, Current Programme | (62) | (70) |
| 11.Existing rate, Timber Production | (55) | (45) |
| 12.Double rate, Timber Production | (76) | (56) |
| 13.Existing rate, Access | (124) | (148) |
| 14.Double rate, Environment | (86) | (86) |
| 15.Existing rate, Farm Integration | (57) | (73) |
| 16.Existing rate, Fuelwood | (44) | (44) |

**Distribution issues.**

A preliminary assessment of the impact of current (the base case) forest policy indicates that a minority of the "Section 75" groups, mainly people with disabilities and older people, are under-represented or disadvantaged in accessing forests for recreational and educational purposes. This is because some of the facilities provided are inadequate to meet their needs. Steps have been taken and more are planned to mitigate the impact of policies on the groups concerned. The adoption of any of the options referred to in the appraisal would not serve to reduce to any material extent the level of differential impact existing under current policy.

The limited scale of forestry activity means that the sector makes modest contribution to government programmes aimed at targeting social need.

**Preferred Options**

Cost cutting options (1, 2 and 3) are likely to cause a loss of confidence by the wood processing sector, leading to reduced opportunities for adding value in NI. In addition, Option 1 relies on untested silvicultural techniques. Option 4 (Reduced Access) and Option 5 (Reduced care of the environment) are not likely to command public support because of their generally negative impact. The preferred option is the base case and therefore there is no immediate scope to generate savings to increase the social and environmental attributes of existing forests without additional sources of funding.

None of the forest expansion options has a positive outcome. Option 16 (Fuelwood production) appears to be the least discounted cost option for forest expansion providing that value added opportunities can be established in NI that complement the existing market for sawmill co-products. As there is currently an oversupply of sawmill co-products these conditions do not exist and it would be less costly to supply any emerging market for Fuelwood from Option 6, (increased production from existing forests. Option 11 (timber production, current rate of expansion) is the next best expansion option and is therefore the preferred option.

**The Balance of Advantage**

Timber production and the value added by timber processing remain the main economic justifications for forestry activity. The key benefits are likely to be the income and employment that can be obtained from forestry and the wood processing industry. As there are about 950 jobs in the

forestry and wood processing sectors combined the annual subvention cost per job is £7,800. The annual value added per job is £19,500.

There is a Present Cost of £51 million incurred in re-establishing forests. Forestry operations have a Net Present Cost (NPC) of £58 million over a 40 year period, before taking account of the £77 million opportunity cost of land. Consequently a more favourable economic option for forest owners is to harvest the trees and reclaim the land for agriculture. In the absence of policy action to prevent it, reclamation of forest for agriculture is likely to happen on most forests. This will lead to reduced capacity to sustain the wood processing sector in NI, and reduced opportunities for public access to woodlands.. This does not happen because most commercial forest is publicly owned, and most private woodland owners place a high value on the environmental benefits of their forests. The second main conclusion is that it is the wood processors, rather than the timber growers, who derive the benefit of growing trees for timber. This suggests that a mechanism needs to be found to ensure that the wood processors take greater responsibility for the future supply of timber. Where this involves a transfer of public forests to the private sector then a regulatory framework will be required that ensures that, as a minimum, forests are adequately restocked after harvesting.

The factors that would improve the economic performance of forestry are lower opportunity costs for land, improved timber prices, and lower costs of growing and maintaining forests and timber harvesting. The focus of industry action needs to be on cost reduction.

There are significant risks on proceeding immediately with options that reduce cost because they rely on untested methods of silviculture. Failure to secure successful regeneration makes timber harvesting unsustainable and places the wood processing industry at risk. Taking account of risk, the balance of advantage between options therefore lies with the base case, but work should begin to secure less intensive forms of forestry intervention that capture most of the benefits of timber production but significantly decrease the costs of doing so.

In the interim, there is a need to recognise the difficulty that woodland owners` face because the expense of thinning plantations and restocking them after harvesting is not justified by the price paid for timber. This results in less timber produced and reduced opportunities to add value through timber processing.

The option to increase timber supply (Option 6) is not attractive and reflects the limited capacity of industry to add value to new supplies with existing capacity and under current market conditions.

This option is one that should be taken up again when there is either a prospect of better markets or of installing new processing capacity.

The consultation responses strongly supported increased expenditure on environmental objectives (Option 9) and there is a business requirement under the UK Woodland Assurance Standard to carry out certain environmental improvements which the assessment of non-monetary benefits recognises.

Withdrawing public access to forests, (option 4) would reduce costs but there would be an almost equal reduction in benefits so that the net effect is not much better than the base case.

The majority of the respondents to the consultation paper, but particularly those representing social interests, wished to see greater priority attached to the recreational development of forests. Most of the visits take place in a very few forests and in these it may be worth giving a higher emphasis to visitor experience. There is likely to be an advantage in a more structured approach to reconciling visitor use with costs at individual properties. Investment is most likely to be justified where it clearly reduces the potential to incur future costs, or where there is large latent demand that can be realised through better promotion and improved facilities. Examples are most likely to arise near urban areas and in tourist areas. The Department of Agriculture and Rural Development itself is not the most appropriate body to have policy responsibility for this activity. Both DoE and District councils have statutory responsibilities for access to the countryside whereas DARD does not, and at times it appears that forestry properties are competing with facilities owned by these bodies.

Public accountability would be improved if responsibility for policy on access provision in forests transferred to DoE and delivery transferred to District Councils in the case of forests with predominantly local demand. During the consultation process some District Councils expressed a willingness to take responsibility for delivering recreational benefits within forests and others indicated a clear preference that responsibility would remain with the Forest Service.

None of the expansion options show a positive return on investment although it is possible that a scaled down approach based on Option 13, (Existing Rate, Access), may do so in the specific circumstances of high population density and lack of access to public open space for informal recreation. Nevertheless the responses to consultation confirm a strong preference for further forest expansion although the reasons vary and include all the options tested. Underlying the reasons it is likely that there is a general concern for protecting the global environment and a wish to make some contribution locally to compensate for continuing strong demand for timber and paper products.

Beyond that there is a concern to protect the economic interests of farmers and the wood processing industry. Despite the high opportunity cost of land, agricultural policy suggests that there is no pressing need to retain land in agricultural use. Consequently forest expansion should continue within the limits of public finance.

Expansion at current rates is less costly than expansion at an enhanced rate. At current rates, Option 16 (Fuelwood) and Option 11 (Timber production) are the least cost options, because both offer a prospect of value added from wood processing. The fuel wood option is attractive because the value added occurs early in the life of plantations compared with conventional forestry. This option complements the timber production options for existing forests by substituting new resources for the scarcer but more versatile resources from sawmill co-products and conventional plantations. However the additional wood supplies should not displace markets for existing timber and there needs to be a strategic decision that the capacity for existing forests to increase production should be retained against a hope of obtaining increased value added opportunities in future. In addition, the new energy plantations should satisfy the environmental constraints on forestry.

Expansion for timber production should also continue (Option 11) to ensure that there will be options for future wood based development. This is because once the option to expand forests is exercised (and thereby incur the opportunity cost of removing land from agriculture) then there are valuable benefits to be obtained from future wood processing opportunities when the trees are finally harvested. The dominant species should continue to be Sitka spruce, supplemented by additional species as required by codes of practice to enhance the quality of the environment.

Over half of current planting (Option 10) takes place for environmental reasons. There is scope to modify strategy to secure more specific environmental objectives and improve value for money. While most woods are planted with environmental objectives in mind and this is the main benefit of converting agricultural land to woodland, there will be an opportunity to realise an economic value from the timber. The importance of the value added factor indicates that even when trees are planted for environmental reasons it is worth taking due care to ensure that there should be an option for future generations to harvest and add value to the timber. Where afforestation is for general improvement of the environment as distinct from the specific requirements of Habitat Action Plans, then quick growing species such as ash are preferred where the land is of sufficiently good quality.

**Integration of forestry and farming**

When it is important that the land continues to provide an annual short-term income then the least cost way of achieving this is through agro-forestry (Option 15). At high discount rates this is the second cheapest option, but at low discount rates it has the same cost as the current programme.

**Implementation: Priorities and Finance**

The high priority conclusions for existing forests are “adding value to timber”, “reducing the costs of growing trees”, “retaining capacity for increased production”, “developing changes to silvicultural practice”, “monitoring environmental diversity”, “improving the quality of the forest environment” and “rationalising access facilities”.

Medium priorities are “a regulatory framework for forests in private ownership”, “restoration of some forests to a pre-forest condition” and “separation of responsibility for policy and delivery of public forest access”. This is because these areas tend to be more contentious, and time will be needed to consult, draft primary legislation and make sure that financing arrangements are in place before achieving effective change. The sale of cutting rights is a low priority because there is no market opportunity due to very low profitability and lack of capital in the processing sector. Encouragement of timber production from privately owned woodlands is also a low priority because of the small scale of the private forestry sector.

There is also much preparatory work to be done to reduce costs in forestry, to prepare a robust and cost effective regulatory framework, and to encourage further value added opportunities in wood processing.

**Conclusions**

1 **The return on forestry investment should be maximised by seeking opportunities to add value through timber processing in NI.**

2 **The Government should consider transferring the risks of growing trees for timber to the wood processors.**

3 **The industry should examine ways of reducing the costs of growing trees and harvesting.**

4 **The Government should consider introducing a regulatory framework for forests in private ownership.**

**5 The preferred approach is to manage existing forests to deliver current levels of timber production along side current access opportunities and environmental benefits.**

**6 The capacity for increasing timber production should be retained as a strategic asset of the NI economy.**

**7 Action should be taken to investigate and implement the most promising techniques of silviculture to secure a significant reduction in the costs of managing plantations.**

**8 The production of timber from privately owned plantations should be encouraged through public support for restocking and thinning plantations, subject to compliance with rules on competition within the Single European market.**

**9 Arrangements should be put in place to monitor and report on the diversity found within the NI forest environment.**

**10 The least productive areas of forest should be restored to a pre-forest condition where there is a conservation gain.**

**11 The quality of the forest environment should be improved to support the biodiversity strategy and other initiatives within the constraints of timber production and public finance.**

**12 Responsibility for policy on public access to forests should transfer from DARD to DoE. The Forest Service should continue to deliver forest recreation services on DARD land as a service provided to DoE and District Councils.**

**13 The balance of expenditure on facilities for forest access should be improved by better monitoring of use, and by closing excess facilities.**

**14 Forest expansion should continue at existing rates because of the strong support for tree planting as a measure to improve the environment and to provide access opportunities for urban populations. This recommendation should be reviewed if the opportunity cost of land changes significantly.**

**15 Where tree planting takes place it should also offer an opportunity to add value, for example through fuel or timber production, or complement existing farming activity.**

# Review of Forest Policy

# Economic Appraisal 2003

# 1 Introduction

This appraisal is being carried out to inform the review of forest policy following publication of the consultation paper "Forestry in Northern Ireland" in June 2002. The appraisal follows the format set out in "The Green Book" published by HM Treasury 1999, and "The NI Preface to the Green Book" published by DFP 1997, and is carried out by the Forest Service.

# 2 The Strategic context.

## *2.1 Policy*

### 2.1.1 Background

Since the last policy statement in 1970 there have been major changes in national, European and international forest policies. These have affected land use and development in general and the changes are reflected in the forestry programmes developed in Northern Ireland. The emergence of internationally agreed statements and binding agreements affecting forests, supported by new environmental standards and codes of practice, has been particularly influential.

Forests in Northern Ireland cover about 6% of our land area. Eighty per cent of forests are state owned, and half of this is in counties Tyrone and Fermanagh. Taken together, the forests produce timber, contribute to improving and protecting our environment, and are a principal means of public access to the countryside. The value of land, buildings and other tangible assets owned by the Department of Agriculture and Rural Development for forestry purposes[1] was £86.9 million. The value of growing timber was £132.9 million (on a replacement cost basis). By extrapolation to include privately owned woodlands, the total replacement value of NI forests was £290 million. From the Income and Expenditure Account, the annual total expenditure by the Forest Service was £25.7 million net of capitalised costs. The income from the sale of timber, recreation and other receipts, and EU funding, was £5.3 million net of the cost of sales, so that the net cost of Forest Operations was £20.4 million. The Cost of Forest Operations includes capital charges of £13.4 million. In terms of cash flow, the Forest Service spent £13.9 million and had receipts of £7.3 million. This includes exceptional activity supporting the Department to combat Foot and Mouth Disease. The Forest Service estimates that a fairer figure of cash expenditure is about £13.1

[1] Forest Service Annual Report and Accounts for the year ended 31 March 2002

million each year and this is the figure used in this appraisal. Of that £13.1 million, £10 million is spent on existing trees. The balance is spent on forest expansion, policy and regulatory matters. Annex 1 (Table 17) provides details.

The forestry sector is closely linked with the wood-processing sector. Sawmills in NI process 80% of timber harvested in NI. Sawmills in the Republic of Ireland process the remaining 20%. The sawmill co-products (chips, sawdust, and bark) are a major raw material for the manufacture of chipboard in NI, for bedding, and garden mulch. Some residues are burnt to produce energy. Significant quantities of sawmill co-products are exported from NI to produce medium density fibreboard door skins at Carrick-on-Shannon or to Scandinavia for pulping. The sawmill and board manufacturing industries sell into the construction industry (for use as structural timber, kitchen furniture, interior doors) and the garden sector (fencing, timber decking). For historical reasons the NI construction sector mostly uses imported timber so that construction grades of home grown timber are often exported to RoI and GB.

Our impact on global forests is much larger; each year we consume forest products (paper, timber, and wood based panels) equivalent to the production from an area one-third the size of Northern Ireland and worth £183 million[2]. Forests have an important balancing effect on the global climate, and they provide many different products. Of these, timber, pulp, paper and panel products are the most important traded commodities, but some embryo work is developing on carbon credits.

### 2.1.2 International forestry policy

Domestic forestry policy, as with agriculture, fisheries and the environment, is strongly influenced and driven by internationally agreed statements and agreements. In forestry these usually relate to sustainable forest management. The most important of these have been: the Statement of Forest Principles, adopted at the 1992 Earth Summit in Rio de Janeiro; Guidelines for the Sustainable Management of Forests in Europe, agreed at Helsinki in 1993; Guidelines for the Protection of Forests in Europe, agreed at Lisbon in 1998; and initiatives arising from the World Summit on Sustainable Development at Johannesburg in 2002. The UK Government was a participant in each of these processes and is also a party to international agreements impacting on domestic forestry policy (for example the Convention on Biological Diversity, Framework Convention on Climate Change, G8 Action Programme on Forests). A succession of United Nations fora under the Commission for Sustainable Development have developed internationally agreed proposals for

[2] From the Forest Industry Committee for GB (FICGB) publication "A reference for the Forest Industry" Table: Imports and Exports 1993-1997.

action and, in 2000 a UN Forum on Forests (UNFF) was created to facilitate implementation of these proposals.

Some of these policy documents, for example the Convention on Climate Change and the Convention on Biodiversity, are binding on the UK Government under international law. Others, such as the UK Sustainable Forestry Programme[3] (currently being revised) set out the UK Government's intentions for implementing broad forestry aspirations, for example the Statement of Forest Principles and the Guidelines for the Sustainable Management of Forests in Europe. In these situations, there is an expectation by the UK Government that the devolved administrations will take account of them in developing and implementing their own policies, for example through the country forestry strategies. They are not however enforceable in law.

A key outcome of these processes has been the development of standards (by the Forestry Commission in consultation with the Department of Agriculture and Rural Development) to deliver internationally agreed commitments for sustainable forestry throughout the United Kingdom. The most important of these have been an UK standard[4] for sustainable forest management, a UK standard for independent forest certification[5] and a new framework of regulatory instruments and advice. The UK Woodland Assurance Standard was produced by a partnership of government departments and agencies, the forestry industry and other Non Governmental Organisations.

Responsibility for international negotiations on forestry matters rests with the UK Government.

In the build up to the 2002 Johannesburg World Summit, Forestry Ministers agreed to publish an UK National Programme on Forests. This consisted of an UK Statement on Sustainable Forestry (setting out the UK's international commitments); the UK Forestry Standard; the Forestry Strategies for England, Scotland and Wales, and the consultation paper on Forestry in Northern Ireland.

### 2.1.3 European Union policy

There is no common forestry policy. However the EC Environmental Impact Assessment Directive (85/337/EEC) and the Habitats, Birds, and Water Framework Directives are examples of European legislation and policy interests that impact on forest management and expansion because of the care

[3] Sustainable Forestry The UK Programme. Cm2429. The Stationery Office 1994
[4] The UK Forestry Standard; The Government's Approach to Sustainable Forestry. Forestry Commission and the Department of Agriculture for Northern Ireland. 1998
[5] Introduction to the UK Woodland Assurance Scheme. UKWAS Support Unit c/o Forestry Commission, Edinburgh. 2000

that needs to be taken in forest operations to protect sensitive habitats. Implementation of the Directives is a devolved matter but close links are maintained with the administrations in GB. Similar considerations apply in relation to other EC instruments, such as the Rural Development Regulation and the structural funds measures that provide important sources of funds.

### 2.1.4 Northern Ireland forest policy

Prior to its suspension the Executive's draft Programme for Government (PfG) published in September 2002[6] stated its commitment "to promoting sustainable living". The PfG went on to state "we want to ensure that our society and economy develop in ways that meet our current needs, while ensuring that future generations too can meet their needs. We want to achieve effective protection of the environment and the prudent use of natural resources, and high and stable levels of economic growth. We need therefore to consider the environmental impact of all key policies. We will seek to do so in an increasingly integrated way, that will embed the principles of sustainable development in the rural and urban economy." Subsequently in publishing its "Priorities and Plans for 2003-2006"[7] Government made it clear that it fully endorsed the principles of sustainable development. Subject to Ministerial approval, Northern Ireland forest policy can therefore be restated in a way that is consistent with the UK's international obligations and current government policy on sustainable development as:

**The government shall promote the sustainable management and development of all forests and woodlands; and**

**The government shall seek a gradual expansion of forests and woodlands as a contribution to global strategies for combating climate change and addressing other forestry issues in a way that delivers benefits to Northern Ireland.**

The Executive identified the following 5 priority areas for action. These were also restated in the Government's Priorities and Plans for 2003-2006.

- Growing as a Community
- Working for a Healthier People

[6] Northern Ireland Executive, Draft Programme for Government, 23 September 2002
[7] Building on Progress, Priorities and Plans for 2003-2006

- Investing in Education and Skills
- Securing a Competitive Economy
- Developing Relations-North/South, East/West and Internationally

Based on how existing forests are used, the forest products derived from them, and the Programme for Government, forest policy should address the needs for:

- an adequate supply of timber and wood products from sustainably managed forests,
- access to the countryside for recreation, tourism and healthy living,
- protection and enhancement of urban and rural environments,
- energy produced from renewable resources,
- diversification of the agricultural and rural economy, and
- education and skills for the forestry sector, and education and social development for young people.

This paper examines the options for forestry programmes in support of the statement of forest policy that best meet the priorities set out in the Programme for Government.

### *2.2 Statutory requirements*

The powers for forestry development in Northern Ireland are contained primarily in the Forestry Act (Northern Ireland) 1953. The Act places a duty on DARD to maintain adequate reserves of growing trees. The Act does not itself define forestry. The definition of forests used by the United Nations Food and Agriculture Organisation is adopted[8], which is stated in terms of land cover. Using this definition, the scope of forest policy covers "forest" and "other wooded land" but excludes "trees outside the forest". A probable consequence of the policy review will be a need to revise forestry legislation to be more precise about the policy objectives and to provide the powers to deliver new forestry programmes.

Under the EC Environmental Impact Assessment Directive, Governments are required in their planning and decision making processes to take account of effects on the environment at the earliest

[8] "Land of more than half a hectare with the canopies of the trees covering more than 10% of the area, which is not under mainly agriculture or urban use".

possible stage. Afforestation and deforestation proposals and forest road and quarry schemes are subject to the provisions of this Directive, enacted as the Environmental Assessment (Forestry) Regulations (Northern Ireland) 2000. The Plant Health Directive imposes a duty on the UK, devolved to NI, to control the entry of certain forestry materials (wood, bark, trees for planting and used forestry machinery) into the EU. The Directive also implements the single European market in respect of the movement of these forestry materials into, within and through Northern Ireland.

### *2.3 Business plans*

Delivery of Forest Policy in NI has mainly been through the direct activity of the Forest Service, an Executive Agency of the Department of Agriculture and Rural Development. The timber crops on the forest estate are maturing rapidly and there is potential to increase the level of economic activity. At the same time the Forest Service also has responsibility for delivering a wide range of environmental and social benefits, and balancing the relative priority to be given to each is a major issue. If the Forest Service were to meet all the demands for increased timber production, increased delivery of environmental and social benefits it would require much greater expenditure on Departmental Running Costs. Alternatively a systematic change in the structure of the Forest Service would be required to accommodate an increased private sector role in managing forestry assets. The role of the Forest Service in implementing the resultant forestry programmes will be a major issue involving a group of 350 public sector employees and a major public asset.

Both the Forest Service and private growers use contractors for some harvesting and planting operations. However most of the capacity to carry out forestry work in NI resides within the Forest Service.

The forestry sector is relatively small in comparison with other sectors of the NI economy, and unlikely to command a significant increase in public funding for the foreseeable future. Therefore the list of policy options should be based on total public expenditure at or about the current levels. Consequently there is as much interest in the composition of the basket of benefits that can be obtained from the different emphasis on policy options as there is from the absolute importance of any one option.

# 3 Need for a forestry programme.

## 3.1 Need for expenditure

The need for government intervention in the forestry sector stems from insufficient private sector investment to deliver opportunities for regional development in rural areas, for public access to the countryside, and for protection and conservation of the countryside and specifically of forests. In addition, government acknowledges the concerns of farmers expressed in Vision[9] that some land under agriculture might have greater value under forest, and recognises the difficulties farmers and others have in investing in long term projects with no prospect of a return for very many years. Government also recognises that other public policies designed to meet agricultural, environmental and social needs severely distort the allocation of land to any particular use, including that of forestry. Finally, the government is concerned to reduce the national demand for energy from fossil fuels as a contribution to alleviating the problems of climate change, and has indicated some willingness to meet the additional costs incurred by sectors such as forestry in achieving this objective.

The private sector progressively reduced its involvement in forestry over many centuries through the sale of trees for timber without adequate replanting, and reclamation of forest for agriculture[10]. While parts of the private and charitable sector have an interest in conserving forests for environmental reasons and providing a degree of public access, over time economic considerations have tended to dominate. In response, successive governments deployed a range of measures to regulate and encourage appropriate forestry activity. The measures included indirect incentives to encourage the private sector through UK taxation policy and grants. While tax measures did encourage forestry investment and introduced people to the sector who brought a new range of business skills, overall it had limited success in NI because of the small scale of land available for planting. This measure is now abandoned throughout the UK.

The need for additional planting was also recognised by previous policy reviews. The low level of private sector activity up to 1988 led to direct public sector intervention by investment in land and growing trees to create significant blocks of forest on poor quality land throughout the country.

[9] Vision for the Future of the Agric-food Industry report published 4 October 2001
[10] The historical decline of forestry in Ireland is summarised most recently in "The restoration of native woodland plantations on Ancient woodland sites belonging to the Forest Service", McKee I, 2001. Internal report of the Forest Service.

That forest still exists and is gradually maturing. While the main financial return from state forests is from the sale of timber, this is not sufficient to pay for the costs of growing forests over several decades. As forest owners do not readily capture income from the main public benefits of forestry through market mechanisms, a continuing element of public support is necessary through a mixture of forest ownership and grant aid. While there may be options to increase private sector participation by sale of public forests, this was not supported by the responses to consultation[11]. Instead there was a distinct preference for continued public sector activity particularly by the Forest Service in the management of existing woodlands, and increased private sector involvement through grant aid for planting new forests.

Since 1988 the private sector has shown renewed interest in planting. The grant schemes encourage planting at a level approaching 700ha each year mainly on farmland. In the 9 years between 1992/93 and 2000/01, grant aided planting reduced the area of farmland by over 6000ha or 0.5%. This was distributed as 1.1% of arable land, 0.5% of improved grassland, and 0.4% of unimproved grassland. The largest absolute amount of planting (68%) took place on improved grassland. The average size of woodland planted by the private sector is 3ha, usually to satisfy landscape and environmental improvement objectives. A survey[12] of participants in the NI planting grant schemes suggested that without public support landowners would probably continue to plant trees at a rate of about 150ha per year, mostly as very small woodlands around large domestic dwellings.

Private forest owners report that the returns from selling timber are very poor and do not justify the expense of replanting forests. Ultimately, there is a poor match between the objectives of forest owners (continuity of ownership in many small land holdings, continuity of the appearance of the estates, return on long term investment) and the wood using industry (large scale, efficient production, consistent marketing and return on medium term investment). The private sector is generally reluctant to guarantee a consistent supply of wood for industry and ensure adequate restocking of harvested woodlands with productive species. Consequently the wood processing industry relies on the continuity of supply available from publicly owned forests. The Forest Service supplies about 40% of the NI industry's requirements; a similar volume comes from a state owned company in the Republic of Ireland and the balance from private growers on both sides of the border. The concern for security of timber supply becomes very important as the scale of investment in processing capacity increases. This leads typically to long term agreements on supply

[11] Consultation Paper, Forestry in Northern Ireland, June 2002.
[12] "An evaluation of the farm woodland premium scheme in Northern Ireland" Report by Canopy, the consultancy division of Scottish Woodlands for the Department of Agriculture, 1995

between governments and industrial companies and a degree of vertical integration of timber supply and wood processing.

The public sector now owns about 90% of the productive growing stock in NI, and needs to determine how to make best use of the asset. There is capacity to increase the volume of production by 50% as existing forests mature, but further investment in harvesting capacity, roads and restocking plantations will be required as a consequence of any decision to harvest this timber.

The private sector has expressed little interest in making forests available for public access, and this need is almost entirely met from the public sector. The Forest Service provides the majority of access opportunities outside local authority and DoE urban and country parks. The consultation responses indicated a strong desire that this need should still be met from the public sector (see Annex 5 for a summary of the responses).

Similarly, there is little evidence that privately owned forests act together in a strategic manner to conserve and enhance the environment. This is needed where action is required at a landscape scale, for example where species require extensive habitats such as red squirrels and deer. The public sector has a clear role in providing a core asset for both public asset and environmental improvement, and in providing leadership to encourage private sector participation in schemes with wide ranging objectives.

### *3.2 Current deficiencies*

The main deficiencies are:

- ***Lack of economic sustainability, reflected as lack of profitability in the forestry sector.***

Although we have a high demand for timber products, and import many times the quantity produced from our own resources, our costs of production are higher than global competitors. This leads to low or negative returns on investment for plantation owners, contractors and wood-processors, and increased calls on public funds to support the supply of wood to industry. There are several reasons for the high costs in NI. NI forestry lacks the economy of scale that is required to support social and environmental policies which have no direct economic benefit to forest growers. NI also has a high wage economy compared with international competitors. The complexity of forestry goals means that a significant proportion of the industry's professional resource (which is in the state sector) is focused on managing and reconciling the conflicting interests of different stakeholders, and the need to protect and account for forestry assets. Timber and tourism receipts alone cannot sustain this.

The economic concerns need to be adequately addressed before the forests planted on deep peat during the 1960s and 1970s come into production. These amount to approximately 25,000ha and exploitation will be technically difficult and potentially expensive because of climatic exposure, variable growth, and poor access and drainage.

In some cases timber production and forestry may not be the optimum land use, and consequently forests should be open to a wider variety of social, environmental or other economic uses, including development for mineral extraction, as screening for development, for energy production, and for telecommunication infrastructure.

- ***We consume a disproportionate share of the world's forestry and energy resources (which are global environmental problems), and the contribution that forestry makes to environmental protection and enhancement of the NI countryside is not optimised. Both deficiencies are due in part to lack of trees in NI. Forests could make a better contribution to diversity in terms of their location, scale, shape, age structure and composition.***

We can help tackle global issues by using wood more efficiently in our buildings (which may increase demand for wood but reduce energy demands), and by planting new forests to store carbon. We can tackle NI issues by appropriate forest expansion, by modifying existing forests, and by restoring habitats.

- ***Forestry does not make sufficient contribution to social policy. This is expressed as a lack of opportunity and encouragement for people to take exercise and participate in sporting activities in forests.***

This has an adverse impact on the general health of the population and particularly but not exclusively for younger people and people with impaired mobility. We can tackle this by improving infrastructure and facilitating wider use of forests, and by creating new forests in places where more access to public open space is needed.

- ***A lack of encouragement for farmers and other landowners to diversify from agriculture into forestry.***

Interest in farm diversification includes several types of forestry, including conventional coniferous and broad-leaved plantations, the use of fast growing species for energy crops, and the concurrent use of land for forestry and pasture (agro-forestry). Forestry is attractive because it offers a less intensive form of land use on farm which is comparable with farmers finding regular work off farm. However most farmers find forestry an unattractive option for several reasons. These include the long period during which land yields no income; the different set of skills and fundamentally different approach to land management that forestry requires, and the isolation of dwellings (and hamlets) as they become surrounded by forests and are enclosed. Existing forestry grants do not

fully compensate for agricultural income forgone. These difficulties therefore encompass a mixture of economic and social factors. Nevertheless, farming is in a period of great uncertainty and even small changes in the economic outlook for farming can bring large increases in forestry activity and this is reflected in the steady demand for planting grants and increasing number of farms offered for sale to the Forest Service.

### *3.3 Quantification and justification of proposed level of service provision over the plan period*

The primary need is to conserve and make best use of the existing 80,000ha of public and private forest in NI. The secondary need is to expand forest cover. Both needs should be met in a way that optimises the contribution that forests make to developing the economy, to providing access to the countryside, and to protecting and enhancing our environment. The consultation exercise indicated strong demand for continuing forestry services expressed in terms that more activity was required in each of these areas, with a preference that the emphasis on social and environmental objectives should increase to match that given to timber production. There was a consistent view that forest cover should increase to at least the average of GB/ROI levels which is 12% of land area. Against this, farmers were not clear about the extent to which they would participate in a significant change of land use, and the public cost is a major factor. It is unlikely that all of the needs can be met because of constraints on public finance, lack of available land for afforestation, and continuing conflicts particularly between aspects of timber production and environmental interests. In the period to 2015, the proposals are:

- ***To manage existing and new public and private sector forests together with ancillary open land, in a manner that makes "best use" of the resources for adding value to the economy and increases the supply of environmental and social benefits from the resource.***

"Best use" at present is a judgement of the mix of outputs that delivers optimum benefit to the economy each year to 2015. 40 indicators of sustainable development in forestry in the UK[13] are being developed, and will be applied where appropriate in Northern Ireland (Annex 2). Progress will be measured with reference to a baseline basket of indicators of sustainable forestry development to be defined by 2005. The existing forest area should be used to support economic development through timber production and tourism, in support of environmental protection and improvement of the countryside, and for public access to the countryside.

- ***To increase the area of forest by approximately 20,000 ha by 2015 by doubling the area of forestry in the private sector together with modest increases in the public sector.***

[13] "UK indicators of sustainable forestry". Published by the Economics and Statistics Unit, Forestry Commission October 2002 (in preparation).

This increases the proportion of land area under trees by 1%, and is almost a threefold increase in the annual rate of afforestation. It is still a small proportion of the total area of farmland in disadvantaged areas, which is where farming is facing most difficulty. The activity is wholly dependent upon the use of modulated receipts and matching national funding. The area of additional forest should complement the benefits of existing forest by improving scale, by adding appropriate diversity, by absorbing carbon and creating energy resources, and by diversifying agricultural holdings.

# 4 Objectives and constraints

**Table 1 Objectives**

| Objectives |
| --- |
| 1. **To at least maintain the value added capacity of existing forests to sustain stable levels of industrial activity in the NI forestry and wood processing sector between 2003/04 and 2014/2015, and make provision for the years following.**<br><br>The measures will include estimates of timber produced and potential production, the value of sawn goods, board products and forest related tourism. The costs will include those of replacing forests, the additional costs to the public road network of timber traffic in rural areas, and will take account of any public support needed to secure investment in additional wood processing capacity. Review will be at approximately 5-year intervals from establishing a baseline. |
| 2. **To improve the contribution which forests make to the quality of the environment.**<br><br>This will be assessed by their contribution towards improving species, habitat, and landscape diversity and alleviating climate change compared with a baseline to be established. The diversity measures are capacity to sustain those priority species for which there are UK species action plans or which are listed in the NI Biodiversity Strategy (e.g. red squirrels). They are also measures of the amount, type and connectivity of habitats associated with semi-natural and new native woodlands, and with other woodland types. Climate change measures are the contribution towards targets set for absorbing carbon dioxide set out in the Kyoto protocol. These objectives are contained within an aspiration to extend forest cover in NI at least to 8% of land area.[14] |
| 3. **To increase the contribution that forests make to social welfare through access to forests for recreational and health giving exercise and for academic and social development.**<br><br>Measures will include periodic surveys in key locations to estimate usage and benefit, and will pay particular attention to the involvement of 'Section 75' groups[15]. Comparisons will be with a baseline to be established. |

[14] This is equivalent to the second lowest forest cover in the British Isles.
[15] Section 75 groups are those categories of people referred to in Section 75 of the Northern Ireland Act 1998.

4. **To encourage the transfer of up to 1% of land (20,000ha) from agricultural use to forestry by 2015.**

Measures will be the area and type of land planted, the increase in the average size of woodland holding and number of participating landowners. Baseline data exists for some measures and has to be established for others.

**Table 2 Constraints**

| **Constraints** |
| --- |
| The options are constrained by the amount of public finance likely to be available for a forestry programme, which is set at broadly the current levels of expenditure. |

# 5 The options

## *5.1 Base case option*

The base case option is to maintain the existing range and balance of outputs within the limits of public finance currently available. From a resource of 80,000ha of forest, each year the forestry sector supplies 400,000 $m^3$ of timber, hosts some 2 million visits, and provides a broad range of poorly defined but nevertheless important environmental benefits including conservation of threatened species and habitats. The base case allows for replacement of 1000ha of forest after harvesting. There is provision to maintain drainage and nutrition in DARD forests with a view to increasing the area available for timber harvesting in future years, but this does not take account of the increased expenditure needed to harvest and restock those areas. The area of forest is expanding by 700ha each year by afforestation of agricultural land.

Forest Service expenditure on its activities of paying grant aid to the private sector, planting, maintaining forests, harvesting, etc. is set out in Annex 1 (Table 17). Each of these activities supports a range of objectives. For example "planting" includes the activities of plantation design and use of tree species to support the objectives of timber production, to encourage use of forests for public access, and to enhance biodiversity. Consequently it is useful to apportion expenditure by activities to broad objectives as a measure of the effort devoted to achieving policy aims. When this was done for the £13.1 million expenditure in financial year 2001/02, 51% of activity was towards achieving economic objectives in timber production and tourism; 20% was towards achieving social objectives of public access to the countryside[16]; and 29% was devoted to protecting and enhancing the environment. Expenditure on existing, mostly public sector forests was £10.0 million (£5.3 million net), and £3.1 million was spent on creating new forests and administration, mostly through grant aid to the private sector.

Several other departments support forestry activity or make use of forestry resources in delivery of their own programmes, and their expenditure is not reflected in this appraisal. DoE designates and monitors woodlands of particular importance for conservation. It also delivers opportunities for public access to the countryside through its network of country parks. DRD repairs public roads incurring additional damage by timber traffic. DCAL makes available its sporting rights over forests for public use and encourages the use of forests for sporting events. INI provides advice and

[16] This excludes expenditure and income for forests where a charge is made. This group is captured as tourism activity.

grant aid to the wood processing and tourism industries. DE advises on the use of forests as a vehicle for delivering the school curriculum, and funds the area boards to deliver youth activities in forests. Some district councils own and manage woodlands for public access.

The private sector has responsibility for activities that add value to timber. This includes most of the harvesting and all of the transport of timber to mills. Private woodland owners (including voluntary and charitable trusts) are responsible for planting and restocking their woodlands (usually with grant aid); and the private sector often carries out value adding activity in public forests by managing cafes in forest parks and providing specialised activities such as horse riding and motor sports. Forests contribute in general terms to the attractiveness of the NI region for tourism, but the contribution of forests to the value added outside the forest boundary is unknown. The charitable trusts and some private landowners also make provision for public access.

## *5.2 Other options*

### 5.2.1 Scope of options

The base case is a complex mixture of economic and other activities generating a wide range of economic, social and environmental outputs that are closely interrelated. This makes the construction of options that are objective driven quite difficult, because a change in the level of any activity has a consequence on several objectives. For example, an option that reduces harvesting activity will reduce replanting activity and reduce public expenditure. It will also reduce the rate and nature of structural change in forests, change the diversity and attractiveness of forests, and reduce the level of activity in the wood processing industry.

The approach taken is to construct options in terms of the effect on public expenditure and estimate the impact on achievement of policy objectives. These options illustrate distinctly different ways in which policy might develop; the analysis and discussion will draw out the extent to which any of these options represents the best way forward. Table 3 sets out the base case and Table 4 to Table 6 set out the broad range of options for managing existing forests and expanding forests along with an indication of the probable costs as the basis for further analysis.

**Table 3 base case: apportionment of expenditure by objectives, £ million.**

| Option | Expenditure | | | | Receipts | Net cost |
|---|---|---|---|---|---|---|
| Base case | Economy | Social | Environment | **Total** | | |
| Continuing management of existing forests | £5.9 | £1.9 | £2.2 | **£10.0** | £4.7 | **£5.3** |
| % of Total Expenditure | 59% | 19% | 22% | **100%** | 47% | |

Option 1 in Table 4 achieves zero net cost of forestry by reducing the range of public forestry activities and costs by 60% (£6million), or commercialises them. Options of this include financing activities through rents and asset sales.

The apparent difference between expenditure on economic objectives and receipts is £1.2 million. A further option therefore is to explore the consequences of attempting to balance this sum by reducing expenditure on activities that are mainly directed at economic objectives. In practice the option requires a much greater reduction in economic activity than £1.2 million because reducing expenditure often causes reduced receipts. For consistency, it is also worth exploring the impact of reducing activity directed at reducing the emphasis given to social and environmental objectives by a similar amount, to establish the effectiveness of expenditure. Consequently, a set of options is generated that reduces total costs by up to 20% (£2 million), by reducing the emphasis given to individual objectives and reducing the choices available to future generations (Options 2-5 in Table 4).

Further options are considered which utilise the potential savings referred to above to increase expenditure on activity directed at other objectives. This generates options for increased economic, social or environmental development of existing forests (Options 6-9 in Table 5), or for forest expansion (Options 10-15 in Table 6). Often the resources can simply be re-deployed to other activities but sometimes it will be necessary to find a new range of skills and experience to achieve the objectives.

Responses to the consultation paper varied in relation to the type of forestry which should be practised in Northern Ireland. In broad terms respondents representing the timber industry supported the case for coniferous forests, while social and environmental interests argued for a much greater emphasis on native broad-leaved forests. Support for energy crops and agri-forestry (this is taken to mean the simultaneous use of land for growing trees and grazing sheep) was also

voiced. Each option is likely to have a differential impact in terms of the location of activity, and the type of forestry practised. The location options for timber production are likely to be where the existing concentrations of forests are and, in the case of forest expansion, where farming is least profitable. The location options for environmental improvement and protection are likely to be where the existing concentrations of forest are, and avoiding locations where there are strong environmental reasons for supporting the existing land use. The fragmentation of NI forests is an environmental concern, and therefore it is important to consider options that are likely to improve the existing degree of spatial connectivity.

**Table 4 policy options: reducing the annual net cost of forestry by up to £5 million.**

| Option | Economy | Social | Environment | Total cost | Receipts | Net cost (Net income) |
|---|---|---|---|---|---|---|
| 1. To achieve no net cost of forestry (by ceasing activity on restocking plantations, by withdrawing non-commercial access, by ceasing Christmas tree production, and reducing maintenance by 55%). | 2.8 | 0.5 | 0.8 | 4.1 | 4.3 | (0.2) |
| The impact of changes in the net cost of £2 million are considered in options 2-9. As the current expenditure on activities that support social or environmental objectives is £2 million, this enables options of with and without expenditure on these activities to be considered. | | | | | | |
| 2. Reduce expenditure by £2 million on restocking and maintaining forests for timber production; | 4.8 | 1.7 | 1.7 | 8.2 | 4.6 | 3.6 |
| 3. To reduce activity on timber production by 33%. | 3.8 | 1.6 | 1.4 | 6.8 | 3.4 | 3.4 |
| 4. To withdraw public access to forests (i.e. reduce the emphasis on social objectives). | 5.2 | 0.9 | 2.0 | 8.1 | 3.6 | 4.5 |
| 5. To reduce activity on protecting the environment to the minimum needed to comply with legal obligations. | 5.9 | 2.0 | 1.9 | 9.8 | 4.2 | 5.6 |

**Table 5 policy options: increasing expenditure on existing forests by £2 million.**

| Option | Economy | Social | Environment | Total cost | Receipts | Net cost (Net income) |
|---|---|---|---|---|---|---|
| 6. Expand harvesting by 25% (Economic objective). | | | | | | |
| | 7.0 | 2.3 | 2.7 | 12.0 | 5.1 | 6.9 |
| 7. Improve tourist facilities (Economic objective). | | | | | | |
| | 7.8 | 2.0 | 2.2 | 12.0 | 4.7 | 7.3 |
| 8. Refurbish and market forest parks and forest recreation areas to improve public access (Social objective). | | | | | | |
| | 5.9 | 4.1 | 2.2 | 12.2 | 4.7 | 7.5 |
| 9. Demonstrate the sustainability of forest management through a process of independent verification and certification, improving biodiversity, promoting energy conservation through the use of wood as a fuel and making forest sites available for wind turbines, and promoting the use of wood as an energy efficient construction material. (Environmental objectives) | | | | | | |
| | 5.6 | 2.0 | 4.5 | 12.1 | 4.7 | 7.4 |

**Table 6 policy options; expand forests at a cost of £3-5 million.**

| Option | Economy | Social | Environment | Total cost | Receipts | Net cost (Net income) |
|---|---|---|---|---|---|---|
| 10. Maintain the current rate of expansion as shown below. | | | | | | |
| | £0.8 | £0.7 | £1.6 | £3.1 | 1.1[17] | £2.0 |

11. Change the nature of planting at the same total cost to support timber production objectives.

Alternatively expenditure on expansion can be increased by £2 million each year to a total cost of about £5 million (excluding any EC receipts), to increase the rate of forest expansion or to change the emphasis of forest expansion. The options are to:

12. Double the rate of expansion to expand wood production capacity (Economic objective),

13. Improve tourist access to the countryside and improve public access to forest near urban areas (Mainly social objective),

14. Improve biodiversity (Environmental objective)

15. Promote integration of agriculture and farming through the practice of agro-forestry (Social objective),

16. Create a wood fuel resource (Environmental objective).

[17] The income refers to EC reimbursement of grant aid paid to the private sector mostly for afforestation of farmland. It is not included in the economic calculations as it is a transfer payment.

### 5.2.2 Description of options

**Achieve zero net cost of existing forests.**

Option 1 achieves zero net annual running cost of forestry by reducing expenditure by almost 60% while continuing those activities that generate net income. Activities that would cease include replacing plantations after harvest, maintaining visitor services and facilities, and about half of forest maintenance (protection and improvement). This option is the most extreme tested and is likely to reduce the economic choices of future generations. It is referred to as the No Net Cost option.

The option is characterised by a widespread effect over NI, with economy (timber production) effects strongest in the west and access effects strongest in the east. Where regeneration of harvested areas takes place naturally, there will be an increasing component of native and naturalised broad-leaved tree or shrub species on lowland areas, with patchy and locally very dense Sitka spruce re-growth on upland peat areas.

**Reduce the net annual expenditure on forestry by £2 million.**

Option 2, (Reduced maintenance) reduces the emphasis on economic objectives by avoiding half of the costs of regenerating forests and reduces drainage and fertiliser activity aimed at increasing the rate of timber production in future years, while continuing to exploit existing timber resources. This option would release land which could have non-monetary costs and benefits relating to peat bogs, or encourage natural regeneration of forests with suitable species without further significant intervention to deliver policy objectives.

The effects of reduced re-establishment are likely to be mainly felt in the upland forests in the north and the west, and the effects of reduced maintenance will be throughout NI. Upland forests will be left to regenerate naturally. The result is likely to be patchy and locally very dense Sitka spruce re-growth on peat areas, and a gradual increase of native and naturalised species (ash, sycamore, willow) elsewhere. Forests on deep peat will gradually become deficient in nutrients and stop growing, and as drainage deteriorates will become less accessible and stocking will decrease.

Option 3 (Reduced Production option). A 33% reduction in timber production would reduce the emphasis given to economic objectives. The option arises because the existence of large volumes of timber accessible to NI mills means that there may be an option of decreasing production in NI as production in RoI increases, so that existing levels of timber processing activity are maintained. As

timber output reduces so forest maintenance activity and timber income are similarly reduced. Harvesting and restocking activity are reduced by 40% as production is focused on the sites that are easiest to harvest.

The effects will be concentrated in the west, and although similar to option 2 will be more extensive. Reduced maintenance and the accumulated effects of storm damage will change the nature of the forest with areas of gradual reversion to blanket bog and open coniferous forest in a mosaic of locally dense forest. Over time large trees may develop in areas of local topographic shelter.

Option 4 (Reduced Access) would reduce the emphasis on social objectives by avoiding the public cost of encouraging access to forests, and providing a local source of Christmas trees. Although access could still occur, for example by introducing a legal right to enter state forests on foot, there would be no provision for ranger services nor maintaining infrastructure such as paths, car parks and toilets. High value facilities could be provided by the private sector for exclusive use by their clients. The option achieves small savings on other activities due to reduced planning and simplified operations, but is unlikely to realise greater savings because of the loss of visitor income and the inescapable need to protect public assets and account in social terms for the impact of forests on neighbours. Overall the option is only likely to produce an improvement in net cost of the order of £0.75 million.

Option 5 (Reduced Care of the environment) reduces the emphasis given to environmental objectives. In this case there are significant legal obligations which require high input in terms of planning and monitoring, for example to avoid pollution to watercourses. Consequently the scope to reduce expenditure directed at environmental objectives is only of the order of £0.2 million. In addition, there is a close link between the environmental quality of state forests and acceptability of NI timber to customers, which would be at risk by placing reduced emphasis on environmental objectives. Consequently, this option is likely to increase the net cost of forestry by £0.25 million. Although it remains in the list of options for completeness it is not viable and is not considered in much detail below.

### Increase expenditure by up to £2 million.

Economic objectives can be strengthened by increasing the supply of timber or by improving the contribution that forests make to tourism.

Option 6 (Increased Production) increases the supply of timber but will increase net cost by £1.6 million. The previous policy created 80,000ha of forest mostly with the aim of supporting economic development through timber production. The achievements of that policy have yet to be fully realised, and approximately 25,000ha of forest mostly on upland peat soils have still to enter production for the first time. There is potential to produce at least 500,000 m3 per year in the period 2006 to 2022 in line with predicted growth expectations, and peaking at 600,000m3 in the period 2008-2017. The option means extending production onto more variable and inaccessible forests. This increase will be in the context of similar or larger increases in production in the northern half of the Republic of Ireland. The option increases production by 25% to 500,000 m3 annually. This will require a 15% increase in harvesting activity and a 30% increase in re-establishment and forest maintenance to reflect the increased difficulties of working these forests. Similarly the generally poorer quality of timber expected from these forests will produce only a 10% increase in revenue. We see only limited opportunities to save costs through the increased scale of harvesting operations, and anticipate further pressure on prices as competition for new markets for sawn goods increases.

The option recognises that the NI industry competes for market share with more efficient suppliers. The industry as a whole needs to move from one where production is dominated by supply, to one where demand and supply come into balance. The consultation responses supported the view of Jaako Poyry, consultants to the Forest Service, that significant new work will be needed to develop markets for any increase in production. This is likely to require major new industrial investment in processes to use the sawmill co-products that increased log production will entail.

The option is heavily focused in the upland areas of the west and north, and new economic investment in timber processing capacity is most likely near Enniskillen. The option allows the greatest structural change in forests in these areas with opportunities to significantly change the forest type by introducing open space and broad-leaved species, and restoring habitats.

Option 7 (Increased Tourism) examines the value that increased expenditure of £2 million a year on tourism in forests is likely to deliver. The consultation process identified a perception that forests have potential to increase the contribution made to tourism. Forests for tourism tend to attract visits in which some economic activity takes place, for example in paying for access, meals or accommodation. These forests tend to be relatively large and have a strong sense of location. They may be a favoured day visit in themselves, or can be a smaller component of a package that targets

tourism in a specific locality. Development is typically focused on a core area providing reception facilities and access to extensive areas of forest supporting a variety of passive and active pursuits.

The Forest Service captures tourism value as daily access charges to Forest Parks and for residential stay in caravans and tents. Although some forests are well used and come close to profit, others do not. In general the facilities are now somewhat dated and new ideas are needed to focus clearly on tourist markets and capture the value both in forests and the neighbouring communities. Some facilities such as cafes do not add value, and there is a need to examine whether their contribution to tourism can be made more effective. An overtly tourism focus is likely to require a distinct change in forest culture, for example by seeking to integrate retail and other development opportunities into the Parks. The option focuses activity east of the River Bann in the main tourism areas, but not exclusively so. The option would see a gradual change of forest type in core recreational areas towards broad-leaved trees, but would retain the more interesting types of conifer such as Larch, Scots pine and Douglas fir particularly where trees grow to a great age, subject to any environmental considerations.

Option 8 (Increased social expenditure for Improved Access) examines the potential for forests to provide social benefits by increased expenditure of up to £2 million each year. By definition social benefits should be easily accessible to all, and there is much less emphasis on economic transactions than is the case for access for tourism. (In practice it is not easy to distinguish visitor objectives this clearly, and compromise is inevitable.) Visitors tend to make short journeys and make short frequent visits; consequently these forests are located close to urban areas, they tend to be relatively small, they are intensively used and need a high standard of design and maintenance for interest and visitor security.

While the major focus of activity is likely to remain in state forests, there is scope to encourage greater use of privately owned woodlands. The option differs from the Tourism option by requiring greater changes to the structure of forests to provide more open space, to improve landscape and interpretation, and enhance a sense of permanence and continuity. It places less emphasis on services. In practical terms this will require greater retention of mature trees and development of different systems of silviculture; investment and maintenance of path surfaces suitable for a wide range of visitors, lighting, signs and information boards; and restoration and interpretation of cultural structures and other visitor facilities. Over time the species composition of forests will change towards deciduous trees in the main visitor areas and the type of under-story will be

controlled to enhance visitor security. A major requirement will be the provision of effective ranger services to re-assure visitors and provide contact between the forest managers and forest users.

Charging for access is an issue. The Forest Service tends not to charge for access close to urban areas because the value of individual visits is low and there are often multiple access points so that charging at the point of access is impractical. Nevertheless in aggregate the total value is high because of the intensity of use. As the most frequent means of access is by car there may be opportunity to capture some of the value as metered car parking charges, subject to ensuring that the charges themselves do not become a significant obstacle for securing social benefits.

Option 9 (Increased environmental expenditure) examines the potential for forests to provide additional environmental benefits by additional expenditure of up to £2 million annually. The range of possible activities is very wide, and for clarity these have been grouped into four measures. Collectively they are known as the Environmental Enhancement options. The measures are:

(i) verifying sustainable management in small woodlands;
(ii) improving biodiversity in existing woodlands;
(iii) contributing to alleviation of climate change by diverting forest resources towards renewable energy generation; and
(iv) contributing to alleviation of climate change by promoting the use of timber as an energy efficient component of a sustainable strategy for the construction industry.

Measure (i) promotes the objective of encouraging woodland owners to demonstrate by a process of independent verification that their woodlands are sustainably managed. There is strong economic pressure by retailers on the industry supply chain to provide independent evidence that timber comes from forests managed according to good practice. As NI timber is not otherwise distinguishable in terms of quality or service, and as this evidence exists for the state sector and most of the larger private forests, the owners of small woodlands find themselves at a disadvantage when marketing timber. The disadvantage is expressed mainly as a difficulty in finding a buyer willing to handle un-certificated timber, and prices may also be reduced. The costs of certification for small woodlands are high in relation to the requirement for monitoring and the infrequent participation in timber markets. This measure covers woodland owners and 22,350 ha of woodland. About 42% is of economic significance.

Measure (ii) seeks improvement in the quality of biological diversity in existing woodlands. The Northern Ireland Biodiversity Strategy[18] stated "The Executive accepts the recommendations

[18] "Northern Ireland Biodiversity Strategy" August 2002

contained within the NI Biodiversity Group Report[19] as the framework for biodiversity action". The Report contains an Action Plan that makes seven recommendations for forestry and woodland management, and includes forestry as an important component of other recommendations. The option will facilitate progress towards achieving the aims of the strategy by focusing on the protection of red squirrels and their habitat; restoring native woodlands in plantations that have strong historical continuity with ancient native woodland cover; and restoring the most valuable open habitats from plantations. There are also environmental problems to be addressed including control of deer, rhododendron and other invasive species. The option is likely to require greater adoption of low intensity management practices such as reliance on self-seeding for regenerating forests and extending the application of continuous cover forestry systems to reduce the impact of timber harvesting in sensitive locations. The measure is location specific but widely distributed over NI. Red Squirrel Preferred Areas have been defined[20] in areas of predominantly coniferous forest, which are located in East and West Fermanagh, the Sperrins, County Antrim and the Mournes. Similarly, the best relics of ancient woodland are in upland areas in the west and the north. Candidate sites for restoration of heath are in south Armagh, of blanket bog in north Antrim, and of blanket bog in uplands generally in the north and west. In contrast, options that favour continuous cover systems of silviculture require well-drained deep soils and are more likely to occur in the east. While deer populations are focused in the larger public forests throughout NI, they are likely to be of increasing concern where forests expand in a predominantly farming landscape.

Measure (iii) recognises that forests have potential to alleviate the impact of climate change by generating energy from wood combustion and as sites for wind farms (forest roads often provide good access to remote exposed sites). Possible activities may include advanced harvesting of plantations, development of markets for poor quality broad-leaved plantations in the private sector, and re-design of replacement forests. There are potential applications for using forest residue and sawmill co-products as fuel sources.

Each of these activities is intended to replace fossil fuel. A recent study[21] found that the major resource available for electricity production is wind energy, based on a price to the end customer of 7p/kWh. This price reflects the current average price of electricity in NI of 4p/kWh plus an inferred

[19] "Recommendations to Government for a Biodiversity Strategy"
[20] UK Strategy for Red Squirrel Conservation – Action Plan for Northern Ireland (2000).
[21] Renewable energy resources in Northern Ireland. A study by PB Power Ltd for NI Electricity with support from the Department of Enterprise, Trade and Investment (DETI) and the Department of Trade and Industry (DTI), September 2002. Confidential.

renewable “premium” of 3p/kWh. As the cost of generating electricity from wood and forestry residues is between 5.69 and 7.19 p/kWh, depending upon whether the discount rate is 8% or 15%, energy from wood is likely to have only marginal potential compared to other sources. Currently there is an oversupply of sawmill co-products and significant quantities are concentrated at a very few sawmills. The sawmill sector is looking closely at the potential for co-generation of heat and power for their processes and with a view to selling any surplus electricity to the grid. Depending upon individual business cases this may tilt the balance of “renewables” in favour of wood, if electricity can be purchased at less than 7p/kWh. This consideration however is driven by market economics and is largely outside the scope of forest policy, except to the extent that wood is diverted from other value-added purposes. So long as the price for renewable electricity is under 7p/kWh this is unlikely to be a major consideration. Similarly, the quantity of electricity available from wood is unlikely ever to be so significant that the Forest Service should take account of energy policy in deciding what quantity of wood to market. The study acknowledges that there may be “considerable potential for very small scale biomass plant generating modest quantities of power and heat for self/local consumption” but did not investigate this further. Consequently, there may be a case for assistance with initial investment in the burning technology or processing capacity to stimulate a market for wood that has no reasonable prospect of finding an alternative use. This is supportive of the broad aim of forest policy, which is to underpin the concept of managing all forests in a sustainable way by creating value for forest products. Such work should be informed by the magnitude of the renewable “premium” operating in the electricity industry and should minimise any distortion in the established industrial market for wood fibre.

In the case of wind turbines the market for suitable sites is well developed and need not be considered any further in policy terms. The property market exists as a business opportunity to be considered at specific locations and balanced against the other practical considerations of forest management. Otherwise the measure is outside the scope of this analysis and is not considered further.

Measure (iv) recognises that the use of forest products as a component in sustainable building can lead indirectly to energy savings because of the low energy costs in manufacture compared with other building materials and the thermal properties of wood in use. As in the case of using forests to produce energy, there is a case to support the timber industry in explaining the properties of its products so that the building and other industry can make informed choices about which material to employ. There are several building codes that direct the industry in the direction of sustainable

building, and it is not the business of forest policy to promote wood over any other building material. To the extent that the market in wood itself is imperfectly informed about the consequences of using wood from unsustainable sources there is a case that government should promote the concept of using wood from reliable sources and set an example in its own purchasing policy. Otherwise the measure is contained within the economic options for forest products and is not considered further as an environmental issue.

### Expand forests by annual expenditure of £3-5 million.

The expansion options complement the existing uses of forest by providing additional capacity. In some cases the expansion options are very location specific, and this will have a major affect on cost.

Option 10, (Current Rate of Expansion) is the existing forest expansion programme. Forests are currently expanding at a rate of about 700 ha each year through grant aid and public sector planting. The annual cost of this is £3.1 million including administration. Expansion at this rate will increase the area of land under forest by 1% of total land area of Northern Ireland within 30 years. About half of this planting is intended to produce environmental benefits. Timber production and the provision of public access have a low priority. The current programme is likely to create a patchwork of small woodlands to complement the farmed landscape outside major forest areas. The impact will be more valuable where existing areas of semi-natural woodland are consolidated, where connectivity and efficiency improves, and where it meets some distinct agricultural needs for increased woodland as a measure to reduce nutrient leaching into watercourses and aquifers by buffering. There are options to vary the emphasis given to different objectives of forestry expansion and to increase the rate of expansion as shown below. For ease of comparison, all options will increase the area under forest by the same amount.

Option 11 (Current rate, timber production) maintains the existing rate of forest expansion but has timber production as the main objective. Option 12 (Double rate, Timber Expansion) achieves the 1% increase in half the time. Both options 11 and 12 assume that most of the expansion is to increase wood production capacity and therefore mainly support economic objectives. Environmental and social benefits are likely to accrue incidentally to achieving the primary objective. Timber production objectives are more likely to be satisfied by new coniferous planting of mainly grassland in the west and north of NI close to existing forests. Expansion is required to maintain productive capacity as existing woodlands are removed from production for

environmental reasons, or to increase the size of the timber resource for future generations. In the latter case there is merit in diversifying the resource to produce high quality hardwood species where growing conditions permit.

Option 13 (Current Rate, Access) maintains the existing rate of expansion and improves access to the countryside. The option covers both tourism and public access to forest near urban areas. The tourism variant consolidates and extends forests in existing tourism areas to make a significant asset that can host extensive activities, and the urban variant creates new forests in close proximity to residential areas. The impact is likely to mainly support social objectives.

Option 14 (Double Rate, Environment) improves biodiversity by planting throughout NI as in Option 10, but at an increased rate.

Option 15 (Current rate, Farm Integration) promotes the integration of agriculture and farming by a focus on forestry options that allow either farming to continue or provide regular short-term income. It is also known as the practice of "agro-forestry", and requires soils that can sustain heavy trampling by sheep and will support tree species that cast a light shade, such as ash. This requires deep, well-drained soils at low elevation. This is known as the Existing Rate, Farm Integration option. Costs are expressed as a proportion of conventional planting. For establishment the costs are 150% and for maintenance 200%. Harvesting costs and benefits are assumed to be the same, but the opportunity cost of land is not incurred until 10 years after planting to recognise the continued agricultural use up to the point when grazing quality declines.

Option 16 (Current rate, SRC) is the planting of short rotation coppice (SRC) to create a wood fuel resource. The SRC option is likely to have strong location features because of the need to minimise the cost of wood transport, and its growing requirement for land below 100m elevation. There are no established markets of any significant scale in NI. Potential markets exist at sawmills to complement supplies based on sawmill residues, at new public projects that have a continuous heat requirement, and for some domestic uses. Costs are assumed to be similar to conventional planting but harvests of 50m3 per net hectare (i.e. after making the normal forestry allowances for access tracks and the land allocated to other species for environment improvement) take place every five years. The unit costs of harvesting are assumed to be no worse than in forestry. The price for wood is assumed to be 70% of that in forestry (reflecting the fact that low quality timber is an existing alternative source of supply) and the value added from chips is assumed to be the same as that from a chipboard mill.

### *5.3 Suitability for PFI procurement*

Forestry in NI is not suitable for PFI projects because the land resource base is too widely dispersed to meet afforestation objectives, and the scale of customer services is too small at all locations to justify the costs of a PFI procurement exercise for forest recreation. However there are options to consider more straightforward privatisation of assets either by outright or leasehold sale, providing suitable regulatory and contractual measures are in place to ensure the continued delivery of public benefits.

# 6 The monetary costs and benefits of options

## 6.1 Capital and recurrent costs of all options, total cost terms

The costs of forestry are those associated with managing forests to produce timber, to produce environmental benefits, to support tourism, and to provide social benefits. The costs are incurred directly on the public estate and by private growers. Land is a capital cost incurred at planting and has a residual value when trees are harvested. Annual costs occur over the 40 or more years during which trees grow before harvest, and in harvesting. Current practice is to incur most costs at plantation establishment. Additional costs are incurred during the life of individual plantations in maintaining drainage and nutrition, in reducing the stocking density to increase the yield of higher value timber; and in constructing and maintaining roads. In some forests there are additional costs of constructing and maintaining recreational facilities, and maintaining plantations to a higher standard than is required for timber production. In addition there are costs of administration and of maintaining skills and knowledge in the sector.

The annual audited accounts of the Forest Service for the period 1997/98 to 2001/02 provide an appropriate basis for deriving unit costs, which have been brought to constant 2001/02 prices by applying a GDP deflator, and averaged over the period. The costing information is contained at Annex 3. The main capital costs are land and buildings. Land is not depreciated, but buildings are. Land is treated in the Account as having a value independent of the trees covering it. The capital costs of machinery are captured as depreciation within the forestry accounts and unit costs, and are not considered separately. Additional information has been taken from the Statistical Review of NI Agriculture 2001 and in particular the material on Farm Structure, which records conacre rents and the number and value of sales of agricultural land.

Although policy is to maintain forests in perpetuity and there are powers to resist the conversion of forest to other land use on environmental grounds, the main alternative use for existing forests is conversion to agriculture. The value of land quoted in the account is consistent with open market agricultural value less the costs of restoring the ground to agricultural use after removing the trees. Some forests may have alternate use for mineral extraction, for industrial development, or for housing. Such considerations are subject to approval through the statutory planning process. The value of land for these kinds of development is usually much higher than under forest. Subject to policy considerations about the relative importance of retaining forests, there is little economic case

for resisting a change of use provided it does not result in fragmentation of the estate and loss of efficiency.

The opportunity cost for land that may become forest is generally that of continuing use in agriculture and is shown as the market value of land.

The opportunity cost of capital for long-term investments in the public sector is 6% per year. We understand that the public sector test discount rate may change to 3.5% from 1 April 2003. The effect of this change is tested below. Some individual aspects of forestry operate on much reduced timescales and very near the commercial world, for example in the management of tourism. In these cases a rate of 8% is appropriate because there is a real choice about whether the activity should be undertaken by either the public or the private sector. Harvesting activity is tested at the rate pertaining to the remainder of the forestry programme, as it is simply one stage in the management of forests.

The main items treated as "income" are receipts from the sale of timber, admission fees to Forest Parks, and the sale of Christmas trees.

Academic work has suggested alternative estimates of the value of forest recreation visits, based on contingent valuation methods[22], sample survey of the most popular destinations, and bulked up according to Forest Service estimates of visitor numbers. In this appraisal estimates derived in 1992 have been valued at current prices and include all forests by applying a value of £0.77 per visit based on the value derived for the least popular destination. The 2002 value for all forests is £2.1 million. The estimated recreational benefit of visits where there is a charge is £0.9million, of which £0.6million is captured in charges. The estimated annual willingness to pay for visits to forests where there is no charge is £1.2 million. The estimate of £1.2 million is treated as a benefit attributed to the social objectives of forestry, and shown separately as a non-market benefit of forests. The estimates of total numbers of visits to forests where there is no charge are best used to represent broad trends only.

No estimate of the value of carbon credit is made.

The financing of forestry activity is a separate matter dealt with in Section 11. This covers the issues of transfer payments (grants) to assist with the private sector costs of planting and restocking

[22] "Parametric and non-parametric estimates of willingness to pay for forest recreation in NI: a multi-site analysis using discrete choice contingent valuation with follow ups" Hutchinson, Scarpa, Chilton and McCallion

plantations after harvesting and, where appropriate, an annual grant payable for up to 15 years to compensate for the value of agricultural income forgone. Another wider economy issue is the exchequer savings from taking land out of agriculture equivalent to the reduced expectation of support for agriculture in future years but this is not included in the financial projections for the preferred option.

### *6.2 Reduced public expenditure options.*

Options 1 to 5 examine the impact of strategies to reduce the net cost of managing the public forest estate. In options 1 and 2 the savings are expected to come from reduced activity, mainly by employing fewer staff (industrial civil servants, their professional and technical managers, and administrators). Experience of cost cutting measures in the Forest Service has shown that there are very few opportunities to re-deploy forestry staff within the NI Civil Service. Consequently there will be additional costs to be borne by the Department from early retirement and other labour shedding measures. These are estimated at £ 6.6 million for option 1, and between £2.2 million and £ 3.2 million for Options 2 to 4. Savings in future years will then arise as a reduced call for Departmental Running Cost expenditure. These also fall into the category of "transfer payments" and are excluded from the economic appraisal although they are relevant to financing the recommended outcome (Section 11).

### *6.3 Effect on other parts of the public sector*

All of the options require complementary action by other Government Departments to secure the required benefits. The harvesting and transport of timber creates a burden for the repair and maintenance of the public road network. Increased availability of timber will raise expectations for public assistance to secure manufacturing investment and possibly with meeting infrastructure costs such as power, roads and water. The tourism options add to infrastructure and build capacity, but need complementary action by the Tourist Board and the private sector to capture added value in accommodation and visitor services. The social option needs complementary activity by the social departments to market the access opportunities for exercise to secure the health improvements.

To the extent that afforestation reduces nutrient loading on farmland (that may be expected to be at least proportional to the area planted), there will be reduced investigation and action on pollution control.

### *6.4 Effect on private sector*

The timber options have a marked impact on the private sector. Those that reduce supply will create scarcity and raise costs to industry because of generally higher timber prices and increased haulage distances. This may place some NI businesses at risk. Those that increase supply offer the prospect of improving the competitiveness of the sawmill sector by increasing throughput and improving the efficiency of production. However a major constraint is the need to find suitable markets for the increased volume of low grade wood and wood residues that will be produced. In the short term increased supply is likely to lower prices for producers. The Forest Service has no information on the elasticity of supply and demand. Nevertheless from our knowledge of markets and the type and location of timber likely to become available for supply we estimate that a 25% increase in supply will reduce timber prices by 12% and result in a 10% increase in revenue. We have included these price reductions in the model to accommodate the effect of increasing supply. This effect will be lost in the general volatility of timber prices as illustrated in Figure 1 page 66.

The expansion options will have a marginal impact on the agricultural sector, although in some cases they may allow farmers to exit the industry on favourable terms. Schemes that offer an annual premium for planting agricultural land allow farmers to retain ownership of their holding while converting to forestry. Where the outgoing farmer achieves conversion to forestry through the sale of property then the presence of a forestry buyer supports the price for agricultural land. Expansion of the rate of afforestation will increase activity by forestry contractors in planning and carrying out the programmes equivalent to the magnitude of the payments to establish the plantations.

# 7 Net Present monetary costs and benefits.

## *7.1 Define phasing and suitable time period*

Taking the life span of the different types of forest into account, the life of a typical plantation is set at 40 years and costs and benefits are discounted over that period. Forestry practice refers to this period as a "rotation" but in view of the more general audience for this paper the simpler word "cycle" is used. In practice some plantations are harvested sooner than 40 years, usually because the risk of damage due to strong winds increases as the trees get taller. In other cases trees are retained beyond 40 years where the species used are relatively slow growing (Scots pine and most hardwood species), or because larger trees are more valuable for saw-milling, or simply because plantations of large trees are more attractive to look at and walk through. In the case of existing forests, currently in Northern Ireland about 1000ha annually enter a new cycle of harvesting, replanting and maintenance. In principle we could assume that forests are harvested, regenerated and maintained in perpetuity but in practice the discounted benefits and costs beyond 40 years tend to be very small. For the purpose of this appraisal the area harvested matches the area replanted each year, and the area maintained is constant, so that in forestry terms it is managed as a "normal" forest. The costs and benefits are therefore discounted to the present. Over this period it is reasonable to expect that there will be re-investment in the existing wood processing industry, and therefore the current estimates of value added are also assumed to continue for 40 years and discounted to the present. As current expenditure supports the harvesting and replanting of 1000ha each year, it follows that this approach means that about 1/3$^{rd}$ of the total area owned by the Forest Service will be excluded from production in the base case. This is because only 40,000ha (40 x 1000ha) out of the 60,000ha of forest managed by the Forest Service will enter a harvesting cycle. However the essential costs of maintaining the 20,000ha which do not enter harvesting are included, so that there will be an option to increase harvesting in future. The additional costs of exercising the opportunities for increased harvesting activity over the remainder of the forest are included in some of the options. In the case of new forests each year sees the beginning of a completely new cycle of planting etc. so that all costs and benefits of each cycle of 40 years are discounted to the present date. The current rate of expansion will increase the area under forest by 1% of the land area of NI over 30 years. The options also examine the effect of doubling the rate of afforestation to achieve the same increase sooner.

In practice, investment in industry tends to have a life of 10 to 15 years. The major sawmills have recently made very substantial investment in plant. Consequently a review of the policy and the

underlying assumptions is required before the next major cycle of investment in wood processing, and no later than 2015. Maintenance on forests that do not enter a cycle is assumed to continue throughout the period with a view to presenting harvesting opportunities and other benefits after the end of the period.

Land and buildings are treated as opportunity costs at present day valuation less the residual value in 40 years discounted to the present time. Where land is afforested for the first time, as in the forest expansion options, its residual value after harvesting is discounted over a production cycle of 40 years. The discounted costs and revenues are shown in Table 7 below. Figures quoted in the text are calculated using a discount rate of 6%. Figures in brackets show the equivalent figure calculated at 3.5%.

### *7.2 Results- base case*

The Present Cost of continuing to manage the forest plantations in the current manner, i.e. growing trees, selling forest products and providing public access from existing forests is £182 (£256) million. The Present Value of the revenue from this is mostly from timber and amounts to £98 (£139) million. The visitor receipts and benefit of free access to forests have a Present Value of £26 million. The Net Present Cost of forestry operations is therefore £58 (£81) million. In addition, the Net Present Cost of land and buildings is £77 (£64) million, so that the total Net Present Cost on forestry is £135 (£145) million.

There is no estimate of the value of field sports activity on privately owned forests, which is significant for individual properties. The impact of adding sporting value is likely to be small in total. The other significant omission may be the value added by motor sports activity in forests. Some of the respondents to the consultation paper suggested that this is an important activity. If the extent of television coverage given to programmes such as Ulster Television's "RPM" is an indicator then they may be right.

NI forests supply 60% of the timber processed in NI mills. The two largest sawmills in NI were asked to calculate the annual "value added" in NI from their most recent accounts. The Forest Service estimated the value added for other mills, plus the value added by NI based harvesting contractors and timber hauliers. The annual value added on the basis of timber supplied from NI forests is £13.4 million. In the absence of NI supplies the NI mills would most likely close or relocate outside NI to minimise the costs of road haulage. Consequently the total value added by the

NI mills is taken into account to show the overall value added by having forestry plantations in NI. This is £18.5 million annually, or a Present Value of £279 (£396) million discounted over 40 years.

The Net Present Value of forestry and wood processing is therefore £144 (£251) million. Further details are provided in Table 7.

**Table 7 Base case discounted costs and benefits 2002-2042**

| Activities discounted costs and income. | 6% £ million | | 3.5% £ million | |
|---|---|---|---|---|
| | Cost | Benefit | Cost | Benefit |
| Present Costs of existing forests. | | | | |
| Maintenance | 36 | | 52 | |
| Re-establishment | 51 | | 72 | |
| Christmas trees | 3 | 1 | 4 | 2 |
| commercial recreation | 6 | 3 | 6 | 3 |
| non-commercial recreation | 22 | 5 | 31 | 7 |
| Value of "free access to forests" | | 18 | | 25 |
| Harvesting | 64 | 97 | 90 | 137 |
| Sub totals: forest operations | 182 | 124 | 256 | 175 |
| **Net Present Cost of forest operations** | **(58)** | | **(81)** | |
| **Net Present Cost of land and buildings** | **(77)** | | **(64)** | |
| **Net Present Cost of forestry** | **(135)** | | **(145)** | |
| Value added by wood processing | **279** | | **396** | |
| **Net Present Value of forestry and wood processing** | **144** | | **251** | |

### *7.3 Results: options for existing forests*

The options for existing forests focus on the ways to improve the benefits from forestry. The cost of land and the benefits from wood processing are assumed to be common to all options although the sensitivity of this assumption to risk is tested in Section 9. The most meaningful comparison between options is therefore the costs of forest operations. Table 8 sets out the comparison of options for existing forests.

**Table 8 Options: Existing forests 2002-2042. Net present benefit of forestry and wood processing, £ million.**

| Option | 6% | 3.5% |
|---|---|---|
| Base case | 144 | 251 |
| 1. No Net Cost | 216 | 353 |
| 2. Reduced maintenance | 175 | 294 |
| 3. Reduced Production | 175 | 294 |
| 4. Reduced Access | 150 | 258 |
| 5. Reduced Care | 146 | 253 |
| 6. Increased Production | 118 | 214 |
| 7. Increased Tourism Provision | 111 | 207 |
| 8. Improved Access | 111 | 203 |
| 9. Environmental Enhancement | 111 | 204 |

Options that reduce the cost of the forestry programme do improve performance significantly. Option 1 has the best outcome and is achieved by realising as many timber assets as possible without incurring expenditure on forest regeneration or maintenance, or public access. Option 2 and Option 3 are the second best options, achieved by maintaining timber production but reducing expenditure on maintaining tree growth, or by reducing timber production but maintaining existing standards of maintenance. Option 4 is the 4$^{th}$ best option, achieved by reducing public access. The least effective cost reduction measure is Option 5 which reduces the costs of protecting the environment, simply because there are very few viable savings available that are consistent with environmental policy.

Options that increase the level of activity all increase the net cost of forestry. Expanding timber production (Option 6) e.g. by improving access and extending harvesting operations onto the area excluded from production in the base case, is unlikely to add significant value added from wood processing because the timber is more likely to substitute for higher cost supplies from the Republic of Ireland. Expanding provision for tourism (Option 7) at the level indicated requires nearly 4 million additional visits to forests each year to justify the expenditure. While this is extremely

unlikely to happen, it does point up the need for tourism related investments to be very focused on customer needs and to take place at a scale appropriate to demand.

Most existing assets that fall into disrepair are unlikely to justify expenditure unless they can be directly linked to significant visitor numbers. Where repairs do take place they should extend the life in service and there should be a clear connection with the tourist economy in the forest region. In the case of improvements to promote general access to the countryside the improvements are likely to be long lasting as they focus more on forest structure. Nevertheless expenditure at the scale indicated would require nearly 3 million additional visits each year to justify expenditure. This is not a surprising result given that expenditure on that scale more than doubles existing expenditure. Consequently, expenditure for this purpose also needs to be carefully targeted and at a scale appropriate to need. A typical improvement with a 10 year life span to capture an additional 5000 visits each year should not cost more than £25,000, and this is more likely to be an appropriate scale for improvements to encourage informal access (Option 8). Nevertheless this should not be taken as an indicator that the value of forests for public access is low. Some properties, for example Belvoir Park, which covers 80 hectares in south Belfast, attracts visits worth £56,000/ha (£80,000/ha), and Hillsborough (180ha) attracts visits worth £19,000/ha (£26,000/ha). Both are close to large urban populations. Tollymore (600ha) represents the typical values for a popular tourist venue, worth £9,000/ha (£13,000/ha).

There are likely to be additional monetary benefits from forests close to urban areas as a result of the general environmental improvement of the area. For example, the proximity of Belvoir Park Forest to privately owned housing is used as a factor in selling houses in the area. While direct comparisons with other housing areas are unreliable, because other factors such as proximity to shops and public transport also have an effect, some inferences may be drawn. In the Belvoir example, which is an area of relatively dense housing (over 1700 properties have ready access to the forest), a modest enhancement of 1% to property value attributable to the forest is significant. In this case it indicates a benefit to the area of the order of £1 million, or £10,000 per hectare of forest. This is of interest when considering alternative uses for the forest such as development for additional housing and in considering the case for forest expansion in Option 12 below.

Expenditure on environmental improvements produces no direct economic benefit (although the Belvoir example above is indirectly relevant in areas of high urban density). However it does increase the costs of the forestry programme significantly. The best outcome under this option is the corollary of Option 1, i.e. to restore some of the least productive forests to a pre-forest condition in

support of biodiversity objectives rather than add environmental attributes to low value coniferous plantations. Consequently the costs of maintaining these forests would reduce but this would also reduce the area under forest in NI.

### *7.4 Results: Options for forest expansion*

The starting point for considering forest expansion is the current programme as in Table 9 below. The costs of land and the benefit from wood processing are likely to be different from existing forests and each option will have a different effect. The main differences between existing forests and new forests are timing and the opportunity cost of land. Existing forests already contain timber and offer immediate opportunities to derive benefits of public access, environmental gain and to add value to timber, whereas these resources have to be created over very long times in new forests. Similarly, land under forests is less valuable than agricultural land because of the cost of restoring forestry land to agriculture. For instance, the existing forest and wood-processing sector (the base case) will produce a Net Present Value of £144 (251) million. In contrast, the Net Present Cost of forest expansion to increase the area of forest by 1% of the land area of NI, at current rates and in the same manner as the current programme will be £62 (70) million net of a wood processing present value of £6 million. Table 10 page 58 shows the costs of other expansion options.

Forest expansion is a significant net cost because costs are incurred mainly at planting (cost of land, cost of establishing forests) but the economic benefits do not occur for many years into the future. Similarly, if Option 10 was modified in favour of greater emphasis on timber production, as in Option 11, then the Net Present Cost of forestry and wood processing reduces to £55 (45) million. Doubling the rate of expansion (Option 12) will leave a Net Present Cost £76 (56) million.

In the current programme half the planting is mainly for environmental reasons and consequently timber and value added benefits are reduced. If the rate of expansion to deliver the programme in Option 10 doubles, as in the environment option (14), then the Net Present Cost increases to £86 (86) million.

**Table 9 Discounted (costs) and benefits of increasing forest cover by 1% of the land area of NI**

**Current expansion at rate of 700 ha/year (£ million.)**

| **9. Forest Expansion: current programme** | 6% | | 3.5% | |
|---|---|---|---|---|
| | Cost | Benefit | Cost | Benefit |
| Harvesting, | (2) | 3 | (7) | 10 |
| Establishment, | (23) | | (33) | |
| Maintenance, | (4) | | (8) | |
| Sub-totals; forest operations | (29) | 3 | (48) | 10 |
| **Net cost of forest operations** | **(26)** | | **(38)** | |
| Net cost of Land | (42) | | (53) | |
| **Net cost of forest expansion** | **(68)** | | **(91)** | |
| Value added by forestry and wood processing | 6 | | 21 | |
| **Net cost of forest expansion and wood processing** | **(62)** | | **(70)** | |

If the programme was re-directed at creating additional timber capacity then the sales of timber and value added benefits would be likely to exceed the cost of forest operations at the lower discount rate by a small margin. This explains the lower Net Present Costs for the Existing rate and double rate timber expansion options (11 and 12) in Table 10 below compared with the current programme. This is also the case for the Fuelwood option (16) because the added value opportunities occur within a few years of planting. The added value is assumed to be equivalent to that from chipboard manufacture, which is an alternative market for wood chips. The opportunity cost of land is also likely to be understated because it needs to be of better quality to support fast growing willows than is usual under conventional forestry, but not to the same extent as for the farm integration option. The performance of the timber options would improve if plantations were thinned to produce timber in advance of final harvest.

Option 15 (Existing rate, Farm Integration) also appears better than the current programme despite incurring greater forest operations costs because the opportunity cost of removing land from agriculture is delayed for ten years. The position between the existing programme and this option is reversed at lower discount rates (because the net discounted opportunity cost of land increases). The same effect happens if land has a higher opportunity cost than is assumed in this example. This is likely because good quality land is needed to support both broad-leaved tree species and sheep whereas land for timber production tends to be of lesser quality.

Option 13, (Existing rate, access) also assumes that half the forests will deliver timber and value added benefits in due course, but includes a much higher net opportunity cost for land. This reflects the better quality and higher market value of land outside the main forestry areas and close to urban areas, set at 250% of the value used for the current expansion option. The current expansion option uses the average price of forestry land, which is close to the average value of the lowest 40% of land sales. The higher value is close to the average value of all land sales. Only a few Forest Service properties show access benefits per hectare of the same scale as in this example. As the costs used in this option do not include provision for constructing visitor facilities (car parking, toilets, paths) and there is likely to be a delay of some years between planting and regular visitor usage, there is a need to evaluate individual projects carefully. Clearly however such projects need to enjoy intensive visitor use early in the life of a plantation if they are to be viable. As the opportunity costs of land increase further (for example where there is an expectation for development) then the costs of this option increase. This has not been included in the cash flow. If this option is being considered for an area where there is a scarcity of public open space or an unsatisfactory environment then any enhancement to the value of surrounding property may be taken into account.

**Table 10 Discounted Present Value of (Costs) and benefits of increasing forest cover by 1% of the land area of NI**

**Further options for forest expansion**

| | 6% | | | 3.5% | | |
|---|---|---|---|---|---|---|
| Option | Net Present Cost of forest operations £ million | Net Present Cost of forestry and wood processing £ million | Ranking (options within 5% have equal ranking) | Net Present Cost of forest operations £ million | Net Present Cost of forestry and wood processing £ million | Ranking (options within 5% have equal ranking) |
| 10. Existing rate, current programme | (68) | (62) | 4 | (91) | (70) | 4= |
| 11. Existing rate, Timber Production | (67) | (55) | 2= | (87) | (45) | 1= |
| 12. Double Rate, Timber Production | (93) | (76) | 5 | (108) | (56) | 3 |
| 13. Existing rate, Access | (131) | (124) | 7 | (169) | (148) | 7 |
| 14. Double rate, Environment | (95) | (86) | 6 | (112) | (86) | 6 |
| 15. Existing rate, Farm Integration | (63) | (57) | 2= | (94) | (73) | 4= |
| 16. Existing rate, Fuelwood | (68) | (44) | 1 | (93) | (44) | 1= |

# 8 Weighing up non-monetary costs and benefits

It is not possible in this analysis to assign monetary costs and benefits to all the attributes of forestry in Northern Ireland. The purpose of this section is to identify and assess the most important issues that have not been covered elsewhere, or where the analysis has been only partially successful in capturing the issue. It also considers if the distribution of benefits or costs falls disproportionately to any particular section of the community.

## *8.1 Impact on non-monetary factors*

Each option is likely to have a different impact on whether forests will be perceived to be managed in a sustainable manner, on the environmental attributes of biodiversity, water and landscape quality, and the extent to which public access to the countryside is affected. The matrix below (Tables 11 and 12) shows where the impact of each option differs significantly from the base case. The impact is set out in greater detail at Annex 4.

Because forestry activity takes place in specific parts of NI there are likely to be distribution issues in terms of equality of access to forestry goods and services and the capacity of forestry to address social need. These are also addressed below.

**Table 11 Existing forests: options and impact on non-monetary factors**

| Option | Impact on policy of sustainable forest management | Quality of the environment. | Public access to the countryside |
|---|---|---|---|
| 1. No net Cost | Policy at risk | Reduced. | Reduced. |
| 2. Reduced maintenance | Policy at risk | Reduced | Reduced |
| 3. Reduced Production | Neutral | Gain | Neutral |
| 4. Reduced Access | Policy at risk | Small gains | Significantly reduced. |
| 5. Reduced care | Policy at risk | Reduced | Reduced demand. |
| 6. Increased Production | Neutral | Slightly reduced. | Reduced quality of some minor public roads. |
| 7. Increased Tourism | Neutral | Neutral | Slight increase in tourist areas. Minor impact on most people. |
| 8. Improved Access | Neutral | Neutral. | Small gains. |
| 9. Environmental Enhancement | Minor strengthening. | Some gains locally through habitat restoration and conservation. Strong gains in urban areas. | Neutral |

**Table 12 Expand forests: options and impact on non-monetary factors**

| Option | Impact on policy of sustainable forest management. | Quality of the environment. | Public access to the countryside. |
|---|---|---|---|
| 10. Current Expansion | Strengthens policy. | Gains on biodiversity and water quality. | Small gains |
| 11. Existing rate, Timber Production | Strengthens policy. | Gains on biodiversity and water quality. | Small gains. |
| 12. Enhanced Rate, Timber Production | Strengthens policy. | Gains on biodiversity and water quality. | Small gains. |
| 13. Existing rate, Access | Minor gains. | Significant gains in urban areas (which may be captured in enhanced value of surrounding property). | Major gains. |
| 14. Enhanced rate, Environment | Strengthens policy | Gains. | Minor gains. |
| 15. Existing rate, Farm Integration | Neutral | Gains, especially on water quality. | No impact |
| 16. Existing rate, Fuelwood | Neutral | Gains, especially on water quality. | No impact |

## *8.2 Distribution issues*

### 8.2.1 Equality Impact Assessment of Forest Policy

Schedule 9 of the Northern Ireland Act 1998 requires the Department to assess the likely impact of policies on the equality of opportunity in so far as these relate to certain categories of people. These categories are defined in Section 75 of the Act (and are known as the Section 75 groups) as:

- persons of different religious belief, political opinion, racial group, age, marital status or sexual orientation;
- men and women generally;
- persons with a disability and persons without; and
- persons with dependants and persons without.

In addition the Department must also have regard to the desirability of promoting good relations between persons of different religious belief, political opinion or racial group.

A preliminary assessment of the current policies, programmes and activities reflected in the base case and their impact on Section 75 groups by reveals that –

- There is no adverse differential impact in the delivery of the Forest Service's core policies relating to the production, management and sale of timber or in the provision of grant aid for private planting.
- There is some evidence that a number of Section 75 groups are disadvantaged or are under-represented in respect of the Service's operation of its policies on the promotion of access to state forests for recreation and educational purposes. This is mainly because the facilities provided are inadequate for the needs of disabled and older people.

This initial assessment is based on existing data and information obtained by the Service mainly from marketing surveys and through recent research. This includes community consultation exercises undertaken by external consultants. The assessment will be the subject of consultation as part of the Equality Impact Assessment process.

The adoption of any of the options referred to in this appraisal would make no material difference to the degree of differential impact of current policies on Section 75 groups.

The Forest Service is already taking steps to mitigate differential impact in the delivery of recreation services through the introduction of capital and maintenance works programmes within its forest parks and recreation areas, such as improved access, toilet and visitor facilities, for the benefit mainly of disabled and older people. Concession charges were introduced for vehicular access to parks for the over 60s to facilitate access. However further improvements are needed through accelerated works programmes and other means of encouraging greater use of forests. The Service also accepts that need to introduce improved signs and better communication in its marketing material and publications generally. There is also scope to improve the balance of participation from Roman Catholic Maintained Schools in the provision of forest based education services. The Service further recognises the need to introduce enhanced data collection systems to assess more accurately the level of uptake and the needs of Section 75 groups in relation to its provision of services.

### 8.2.2 New Targeting Social Need (New TSN)

The limited scale and the nature of annual forestry expenditure and activities means that these make a minimal contribution to government programmes aimed at targeting social need. Currently the majority of forestry grants for private planting currently fall into the areas of greatest social need in NI as defined by the Noble indicators of multiple deprivation. To date it has not been necessary to "target" grant aid as the current level of funding available to the Department is capable of meeting all qualifying applications. These grants help to create employment in the areas concerned. In relation to the Service's strategic objective to promote access and recreation within its forests, evidence from past surveys and research indicates that there is an under-representation of forest use from lower income groups. The difficulties in getting to forests by public transport are the most likely reasons for this.

# 9 Appraising Risk and Uncertainty

This section summarises the main risks to a forestry programme. Risk is a term used to include both the potential impact of a particular change in circumstances and the probability that the change will occur. Risk is presented in terms of the sensitivity of the Net Present Value estimates to changes in important assumptions. Annex 6 sets out the discussion of risk in greater detail.

## *9.1 Main risks*

The challenge for the forest and wood products industry is to match the availability of forest resources with the demand for forestry products and services at a price that adequately covers the costs of production. The main costs are the opportunity cost of land for forestry, the cost of regenerating and maintaining forests after planting, and the cost of new planting for forest expansion. The main benefits come from the sale of timber (which is the product of price and volume) and value added in wood processing. Of these, the main factors at risk are the opportunity cost of land under forest as a consequence of policy changes; the success of novel techniques of silviculture intended to reduce the costs of regenerating forests; the price of timber; and the continuity of the wood processing industry.

### 9.1.1 Policy risk: Opportunity cost of Land

The market price of agricultural land is expensive compared with other parts of the UK, but is consistent with the price of land in the Republic of Ireland. There is little prospect of much reduction in land values despite consistently poor agricultural performance for many years. In contrast policy changes may reduce the residual value of forestry land. For example several respondents to the consultation document said that legislation should be introduced to regulate felling and restrict the opportunity to return land to agriculture or other use. Under these circumstances and based on current economic performance, the resulting value of land for forest use is likely to be very low. The effect would be to decrease the opportunity cost of land under trees and reduce the net cost of forestry. However this may also lead to reduced private sector interest in forest expansion if the consequence is seen as immediate erosion of capital value on converting agricultural land to forest. This has no effect on the ranking of options within forests and is not considered further.

### 9.1.2 Economic risk: Use of novel techniques of silviculture.

Options 1 and 2 depend upon the success of novel techniques of silviculture to regenerate forests after planting. As this is largely untested there is a risk of failure and additional cost to make good

that failure. The dominant system of forest management in the British Isles is by clear cutting and replanting using young trees grown in a nursery. Recent thinking suggests that greater reliance should be placed on alternative systems of silviculture and use of natural regeneration. The risk is greater variability of replacement forests, increased risk of damage due to storms, longer regeneration periods, less assurance of successful regeneration and less scope to improve timber quality through tree breeding and selection. The impact of changed practices is likely to be cumulative and apparent over the long term. The practices have not been fully tested and the sustainability of alternative systems is uncertain. The risk can be reduced by research, by publishing advice, and by retaining the services of professionally qualified and experienced people.

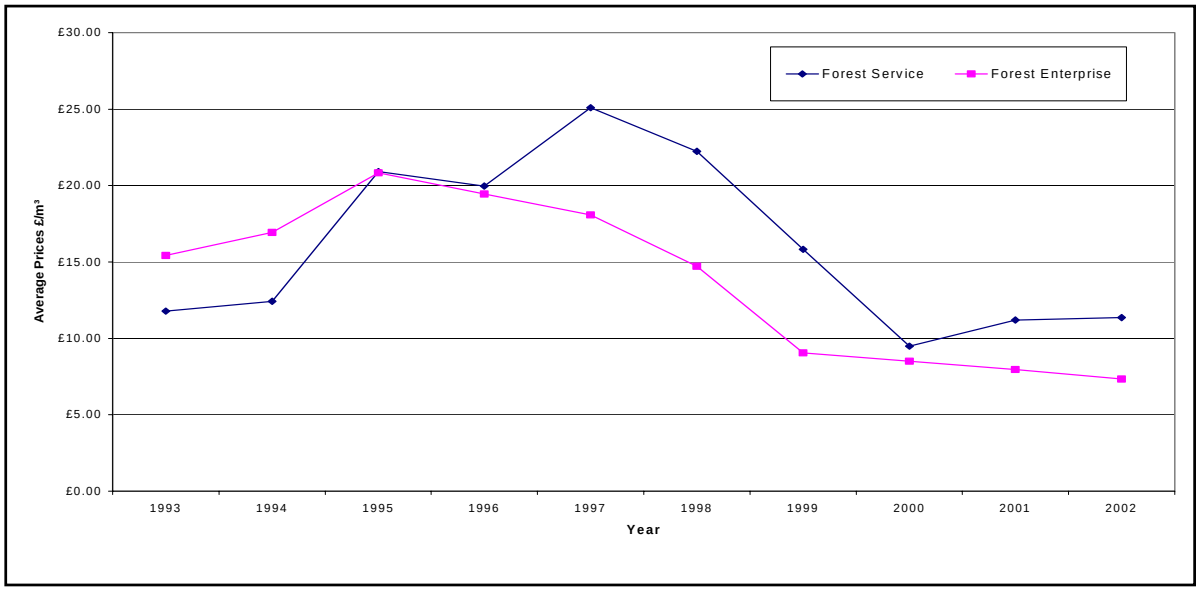
The cost difference between low and high-risk silvicultural systems is up to 100% of the cost of reinstating base case planting and maintenance programmes. If remedial work did not take place promptly then there would be a long-term loss of productive capacity and a consequent loss of confidence in the government's commitment to forestry by the wood-processing sector. Option 1 relies more on the success of novel techniques than option 2 and therefore carries most risk. The effect on net present value is shown in Table 13. The risk will remain with the owners of plantations.

### 9.1.3 Economic risk: Variation in timber prices

The demand for home grown forest products is reflected in the price that wood processors are willing to pay for raw material supplies, based on their knowledge of the market for finished goods sold in competition with timber imports and their own costs of production. Prices are essentially set by the supply and demand for imported timber, particularly from Sweden, and very sensitive to relative movements in the value of currency. Timber prices have fallen steadily to the extent that current prices are now 72% of the average price used in the present value estimates. They have stabilised in NI but are still falling in GB. The risk is that prices will continue at present levels or even fall further rather than return to the average price used in this analysis. The effect of prices remaining at current levels, (i.e. a reduction of 28% on average prices) is shown in Table 13. Figure 1, on page 66 shows the relative variation on timber prices in 2002 terms between 1993 and 2002.

The owners of plantations carry most of the long-term risk. There may be an opportunity to transfer property rights and risk to the wood processing industry.

**Figure 1: Timber Prices £/m3 1993-2002, at constant 2002 prices**




**Standing sales of timber NI (Forest Service) and GB (Forest Enterprise)**

### 9.1.4 Economic risk: Continuity of the wood processing industry

The analysis depends heavily on the value added by the wood processing industry. Industry profitability is low. The wood processors are also very sensitive to issues that may affect timber supply and therefore any option that may cause a loss of confidence by wood processors leading to lack of re-investment in processing facilities and relocation outside NI is a major risk. These are commercial businesses (some owned by international companies) and some are known to be thinking about their long-term interest in Northern Ireland.

The Forest Service has implemented a series of business improvement measures that have stabilised the supply of timber to industry, saved costs and encouraged industry to focus on process improvement and marketing. However the risk remains high. The greatest pressure is on the chipboard mill at Coleraine. This contributes around 10% of NI value added. If that mill closed then its contribution to value added would be lost and profitability of the sawmill sector would be reduced. We have tested the effect on the base case of this mill closing by assuming a 50% probability that the chipboard mill will fail and that its impact on other parts of the sector will be 150% of its value added contribution. The risk is common to all options except those that increase

the risk by reducing business confidence in the saw-milling part of the industry. If the outcome of the policy review was a broad conclusion that there should be less emphasis on timber production then it would be reasonable to expect a lack of re-investment in the sector beginning with the chip-board mill and rapidly extending to sawmills, and consequently reduced added value opportunities. This is most likely to happen for options 1 and 2, which will be seen chiefly as cost cutting measures. The effect of a progressive loss of value added opportunity has been estimated by assuming that the contribution of manufacturing value-added reduces by 5% a year for 10 years to 50% of current value.

The risk to value added opportunities for forest expansion options is not considered.

### *9.2 Estimating the Risk*

Table 13 below sets out the economic consequences of the risks described above.

**Table 13 Effect of Risk on NDR in Existing forest @ 6% discount rate, £ million, and rankings at 6% and 3.5%.**

**Existing forest**

| Options | Net present value of forestry and wood processing | Timber price: Average price falls by 28% | Continuity of industry: effect of reduced value added | Novel silvicultural techniques | Total economic risk | Ranking of Options after risk. (Options within 5% have equal ranking.) 6% / 3.5% |
|---|---|---|---|---|---|---|
| **Base case** | **144** | **-27** | **-22** | | **-49** | **2=/1=** |
| 1. No net cost | 216 | -27 | -106 | -144 | -277 | 10/10 |
| 2. Reduced maintenance. | 175 | -27 | -106 | -13 | -146 | 9/9 |
| 3. Reduced production | 175 | -19 | -106 | | -125 | 8/8 |
| 4. Reduced access. | 150 | -27 | -22 | | -49 | 1/1= |
| 5. Reduced care | 146 | -27 | -22 | | -49 | 2=/1= |
| 6. Increased production | 118 | -30 | -22 | | -52 | 4/4 |
| 7. Tourism | 111 | -27 | -22 | | -49 | 5=/4 |
| 8. Improved access. | 111 | -27 | -22 | | -49 | 5=/4 |
| 9. Environmental enhancement. | 111 | -27 | -22 | | -49 | 5=/4 |

**Forest expansion**

| | | | | | | |
|---|---|---|---|---|---|---|
| 10. Current expansion programme | (62) | -1 | 0 | | -1 | 4/4 |
| 11. Existing rate, Timber Production | (55) | -2 | -1 | | -3 | 1=/1 |
| 12. Enhanced Rate, Timber Production | (76) | -2 | -1 | | -3 | 5/2= |
| 13. Existing rate, Access | (124) | -1 | 0 | | -1 | 7/7 |
| 14. Enhanced rate, Environment | (86) | -1 | -1 | | -2 | 6/6 |
| 15. Existing rate, Farm Integration | (57) | -2 | 0 | | -2 | 3/5 |
| 16. Existing rate, Fuelwood | (44) | 0 | -12 | | -12 | 1=/2= |

### *9.3 Preferred Option*

Consideration of risk changes the rank order of options. This is because options 1, 2 and 3 are more likely to cause a loss of confidence by the wood processing sector, leading to reduced opportunities for adding value in NI. In addition, option 1 relies on untested silvicultural techniques. The options with the greatest Net Present Value are Option 4 (Reduced Access), Option 5 (Reduced care of the environment) and the base case. However Options 4 and 5 are not likely to command public support because of their non-monetary impact (see Table 11 in Section 8.1), so that the preferred option is the base case. As the base case is the preferred option there is no immediate scope to generate savings to increase the social and environmental attributes of existing forests unless efficiency gains release funds or additional sources of funding become available.

None of the forest expansion options has a positive outcome and risk is not a significant factor except in the case of the fuel wood option, because it relies on the development of new value added opportunities for this material in NI. Option 16 (fuel-wood production) appears to be the least discounted cost option for forest expansion providing that value added opportunities can be established in NI that complement the existing market for sawmill co-products. As there is currently an oversupply of sawmill co-products these conditions do not exist and it would be less costly to supply any emerging market for fuel wood from existing forests Option 6, (increased production). Consequently, Option 11 (timber production, current rate of expansion) is the preferred option.

# 10 Assess the balance of advantage between options, present results and conclusions

## *10.1 Existing forests: the main themes.*

The main economic output from forestry is the sale of timber (NPV of £97 million) and this is enhanced by the value added to the NI economy from processing the timber (NPV of £279 million). The economic value of access to forests is much less (NPV of £26 million). This includes the value of sporting leases on public forests but excludes the value of this activity added by tenants and on private land. It also excludes important woodland properties such as at Crawfordsburn (DoE), where individual properties are likely to show a surplus of recreation benefits over costs because of high levels of visitor use. Because most visits originate within NI there is unlikely to be a large value added chain outside the forest boundary. There is little direct economic benefit from the current emphasis on protecting and enhancing the environment. The indirect effect on surrounding property is likely to be significant, as is the non-monetary benefit.

Timber production and the value added by timber processing are the main economic justifications for forestry activity. The key benefits are likely to be in the form of the income and employment that can be obtained from both forestry and the wood processing industry. The issue is the extent to which public support for forestry should underpin this. As there are about 950 jobs in the forestry and wood processing sectors combined the annual subvention cost per job is £7,800 and the annual value added per job is £19,500. The wood processing employment is concentrated in the local government districts of Fermanagh, Limavady and Coleraine, although it is likely that some employees live outside these areas and travel into them to work. These districts occupy median positions in the Noble indicators of deprivation for income and employment.

The analysis makes clear that there is a Present Cost of £51 million incurred in re-establishing forests and that forestry operations have a Net Present Cost (NPC) of £58 million over a 40 year period, before taking account of the opportunity cost of land (£77 million). Consequently a more favourable economic option for forest owners is to harvest the trees and reclaim the land for agriculture. Unless forest owners place a greater value on the land because of the non-monetary benefits such as the environmental attributes then, in the absence of policy action to prevent it, reclamation of forest for agriculture is likely to happen on most forests. This will lead to reduced capacity to sustain the wood processing sector in NI (Section 4 objective 1), reduce the opportunities for public access to woodlands (objective 3), and is contrary to the aim of transferring land from agriculture to forest (objective 4). The reason this does not happen at present is that most

commercial forest is publicly owned, and most existing private woodland owners place a high value on the environmental benefits of forests. From time to time some woodland owners do express their wish to reclaim woodland for agricultural use and this is resisted where there are strong environmental grounds. This will be harder to resist on most coniferous plantations.

The second main conclusion is that it is the wood processors, rather than the timber growers, who derive the benefit of growing trees for timber. This suggests that a mechanism needs to be found to ensure that the wood processors take greater responsibility for the future supply of timber. Usually this means some form of vertical integration between growing and processing timber. One major private sector grower in NI is understood to be a shareholder in a sawmill, but this is exceptional. In the Republic of Ireland, the Irish Forestry Board "Coillte Teoranta" recently acquired the majority interest from Louisiana Pacific in the mill producing Orientated Strand Board (OSB) in Wexford. In other cases the wood processors may seek to secure continuity of timber supplies by acquiring long leases over forest.

The present costs are not a good guide to the price that could be obtained for open market sales of forests, because they only reflect the costs of public sector activity. A better guide is the price that might be achieved in GB by similar property[23] in the private sector. On this basis the value of the Department's forests is unlikely to exceed £118 million (which is significantly less than the book value of £220 million). The difficulty is that the wood processors do not make sufficient profits to cover the loss from timber growing. In view of the magnitude of the costs of growing timber it is likely that the wood processors would only wish to acquire the minimum rights to allow them to manage forest for timber production. Therefore it will be necessary to separate the right to manage trees and cut timber from the use of land for other purposes such as for forms of public access. Timber processors would expect to manage forests in a cheaper manner than is possible under public ownership and would resist paying for public benefits such as enhanced environmental benefits and maintaining facilities for public access. Transfer to the private sector would require a regulatory framework that ensures that, as a minimum, forests are adequately restocked after harvesting. Such a framework is likely to remove the option of reclaiming forest for agricultural use and therefore result in much lower opportunity costs for existing forest. This will have an immediate downward effect on the balance sheet of organisations that own forests.

[23] Investment Property Databank Ltd (IPD) UK Forestry index 2002, 7/8 Greenland Place, London NW1 0AP

The factors that would change the economic performance of forestry are lower opportunity costs for land, improved timber prices, and lower costs of growing and maintaining forests and timber harvesting. Opportunity costs and timber prices are largely outside the control of the forest industry, so the focus of industry action needs to be on cost reduction.

### Conclusion

1. **The return on forestry investment should be maximised by seeking opportunities to add value through timber processing in NI.**

2. **To consider the transfer of the risks of growing trees for timber to the wood processors.**

3. **To examine the ways of reducing the costs of growing trees and harvesting.**

4. **To consider introducing a regulatory framework for forests in private ownership.**

## *10.2 Existing forests: Timber supply.*

The deficit on forest operations in the base case shows that there is a need is to reduce costs by 30% or more.

Table 13 shows that options 1 and 2 offer the prospect of improving net present value by reducing the costs of growing trees to produce timber, but these gains are subject to two important related risks. These options rely on natural means of regenerating forests. To the extent that forests do not regenerate successfully then there is a risk that the basis for locating a wood using industry in NI begins to disappear. Similarly Option 3, to decrease the rate of timber production, may precipitate factory closure in NI and cause loss of added value. If factories close for other reasons then it would be prudent to look again at the balance of timber supply and demand. Taking account of risk, the balance of advantage between options therefore lies with the base case, but work should begin to secure less intensive forms of forestry intervention that capture most of the benefits of timber production but significantly decrease the costs of doing so. The history of forestry practice in the British Isles indicates that the industry does respond to economic pressures to improve efficiency, and we believe that progress in NI can be made in the years to come. However there is a need to rebuild the research and development capacity withdrawn in recent years to investigate novel solutions to specific industry problems and bring them into general practice in a controlled manner.

In the interim, there is a need to recognise the difficulty that woodland owners` face because the expense of thinning plantations and restocking them after harvesting is not justified by the price

paid for timber. This results in less timber produced and reduced opportunities to add value through timber processing.

Option 6, to increase timber supply, is the least attractive timber production option for use of existing forests, and simply reflects the limited capacity of industry to add value to new supplies with existing capacity and under current market conditions. This option is therefore not for the present, but is one that should be taken up again when there is either a prospect of better markets or of installing new processing capacity. The additional wood supply likely to become available in NI and the neighbouring parts of the Irish Republic is enough to sustain a new board mill but there are major difficulties. One difficulty is the presence in Ireland of two small board mills making similar product and competing for the limited Irish market, so that any additional production will be for export. Another difficulty is the price that board mills can afford to pay for raw material. Although virgin wood chips do make better quality boards, for many purposes boards manufactured from wood recycled from urban areas is acceptable. Recycled wood is plentiful in GB as a consequence of landfill taxation, but is less plentiful in Ireland because of the population differences. The best prospect for Irish board manufacturers is probably as suppliers of limited quantities of high quality boards. Market share will be contested and factor closure is possible. A further complicating factor is the cost of energy in Ireland. This is expensive compared to most other competing countries, and together with low prices for sawmill co-products is forcing the sawmills in particular to consider using some of the wood as a fuel source for their kilns and for electricity generation under the impetus of energy policy. This will increase competition for sawmill co-products and in the absence of additional supplies may put the price beyond the limits of affordability to board manufacturers. Consequently Option 6, the ability to increase supply relatively, is a valuable factor in the relative attractiveness of NI for inward investment in refurbishing existing capacity and improving competitiveness and retaining added value opportunities. This will require close co-operation between INI and the Department to secure a good use for this resource at the appropriate time.

There are opportunities to add value to existing low value plantations and semi-natural woodland, but the returns will not cover the costs of forest operations. For example they can supply fuel wood and stems to produce timber in short lengths. This can be the basis for farm based craft industries where a tourist market can create a demand for wooden goods, as appears to be happening in parts of Wales.

Conclusion

5. **The preferred approach is to manage existing forests to deliver current levels of timber production along side current access opportunities and environmental benefits.**

6. **The capacity for increasing timber production should be retained as a strategic asset of the NI economy.**

7. **Action should be taken to investigate and implement the most promising techniques of silviculture to secure a significant reduction in the costs of managing plantations.**

8. **The production of timber from privately owned plantations should be encouraged through public support for restocking and thinning plantations, subject to compliance with rules on competition within the Single European market.**

### *10.3 Existing forests: Environment protection and enhancement*

There are no realistic opportunities to reduce expenditure on environmental protection and enhancement. Most expenditure is the direct consequence of observing industry codes of practice and complying with legislation. Improvement works are often linked to demonstrating good standards of forest management and find value in being able to market timber as the product of good management. The industry has concerns that the current standards are making forestry in the British Isles unsustainable because timber supplied by competitors often is not subject to these costs. However there is little doubt that the people of Northern Ireland expect very high standards of management in forests, and cost cutting through lower environmental standards would have little public support. Option 5 is therefore rejected.

Option 9 tested the potential for additional expenditure on environmental objectives in existing forests. The consultation responses strongly supported additional work in this area, but they do not yield direct economic benefits and therefore judgement is needed to determine the relative weight of environmental projects in the forestry sector against those in other sectors. There is a business requirement under the UK Woodland Assurance Standard to carry out certain environmental improvements. These include surveys of existing woodlands to determine the sites of greatest importance to conserving the environment and which should be restored to native woodland species. In some cases sites should be restored to the condition they were in prior to afforestation, and in others measures should be taken to encourage particular woodland species. This work is consistent with the proposals set out in the NI Biodiversity Strategy. Individual projects are best

approached on a case by case basis to ensure the activities are closely targeted to business need and represent value for money. This is more likely to be the case where they are properly integrated into other forestry work so that, for example, trees can be retained long enough to produce timber before restoring land to a pre-forest use. This expenditure is additional to that required to observe legal requirements and codes of practice but reflects the higher standards required by some retail chains acting on the advice of environmental organisations. In any year the volume of expenditure is likely to be constrained by the capacity of forest owners to plan and supervise work along with other responsibilities.

As a minimum there is a clear need to monitor and report on existing trends and achievements, which will require additional professional and technical capacity. Further activity is recommended at an increased expenditure level of £1.0 million annually.

### Conclusion

9. **Arrangements should be put in place to monitor and report on the diversity found within the NI forest environment.**

10. **The least productive areas of forest should be restored to a pre-forest condition where there is a conservation gain.**

11. **The quality of the forest environment should be improved to support the biodiversity strategy and other initiatives within the constraints of timber production and public finance.**

## *10.4 Existing forests: Public access*

Option 4, withdrawing public access to forests, would reduce costs but there would be an almost equal reduction in benefits so that the net effect is not much better than the base case. However the picture is probably not consistent across NI, so that some forests are heavily used and people get a large benefit from the property, while at others the use may be very small. This is the largest interface between people and the forestry industry, and reduction in effort universally would have virtually no public support. The option is not recommended.

The majority of the respondents to the consultation paper, but particularly those representing social interests, wished to see greater priority attached to the recreational development of forests. Although the evidence (Options 7 and 8) does not support this view in general terms, most of the

visits take place in a very few forests and in these it may be worth giving a higher emphasis to visitor experience. For example, the riverside walkway at Glenariff Forest Park reached the stage where continued use presented an unacceptable risk to visitor safety and was closed pending repairs. The Park occupies a key site as a gateway to the Glens of Antrim, and attracts about 45,000 visitors annually. Closure of the walkway attracted significant comment locally and from elected representatives, and the potential for lost visits and the impact on local tourist facilities was sufficient justification to invest in repairs. The need for additional expenditure was accepted and repairs are in progress. Each case is different and should be considered on its merits, taking account for example of the direct impact on forest costs, the direct benefits from the visits, and indirect benefits from local tourism. There is likely to be an advantage in a more structured approach to reconciling visitor use with costs at individual properties. Investment is most likely to be justified where it clearly reduces the potential to incur future costs, or where there is large latent demand that can be realised through better promotion and improved facilities. Examples are most likely to arise near urban areas and in tourist areas. As the investments are likely to be modest and the scope for economic surveys is limited, an appropriate measure of benefit is about £0.77 per visit[24] (index linked) unless there is clear evidence to indicate a different figure.

Most expenditure falls to the Forest Service, and Forest Service costs are understood to compare favourably with those of other providers (mainly EHS and District Councils). It is more likely that the Forest Service is distributing its effort too widely, so that expenditure is taking place on areas of low use. However a key factor is the poor quality of information on visitor use in areas where access is free and it is possible that visitor use is under estimated. There is therefore a need to collect and monitor data on visitor use in these forests. In other cases the assets may simply be too expensive to maintain in relation to the benefits and some change in the facilities and level of service is required. Measures might include repositioning car parks closer to public roads, withdrawing underused paths from service, and concentrating expenditure and improvement on the most valuable public areas. There will be some additional expenditure due to the cost of restoring land where facilities are no longer required. A further consideration is whether the Department of Agriculture and Rural Development itself is the most appropriate body to have responsibility for this activity. Both DoE and District councils have statutory responsibilities for access to the countryside whereas DARD does not, and at times it appears that forestry properties are competing with facilities owned by these bodies. In addition, some benefits of forest visits are not widely

[24] "Parametric and non-parametric estimates of willingness to pay for forest recreation in NI: a multi-site analysis using discrete choice contingent valuation with follow ups" Hutchinson, Scarpa, Chilton and McCallion

distributed across NI but instead accrue mainly to individual settlements. Public accountability would be improved if responsibility for policy on access provision in forests transferred to DoE and delivery transferred to District Councils in the case of forests with predominantly local demand. During the consultation process some District Councils expressed a willingness to take responsibility for delivering recreational benefits within forests and others indicated a clear preference that responsibility would remain with the Forest Service. The latter is probably justified on cost grounds and the benefit of marketing visitor attractions under the Forest Service brand name for facilities in tourist areas, but the case is less convincing where the main demand arises within a single local authority area. Consequently DoE and District Councils should finance access provision in public forests. Where the Forest Service is the lowest cost provider then the Forest Service should deliver the service but under formal contracts with DoE and Councils.

### Conclusion

12. **Responsibility for policy on public access to forests should transfer from DARD to DoE. The Forest Service should continue to deliver forest recreation services on DARD land as a service provided to DoE and District Councils.**

13. **The balance of expenditure on facilities for forest access should be improved by better monitoring of use, and by closing excess facilities.**

## *10.5 Forest expansion*

The expansion options have a common aim of extending forest by 1% of the land area of NI, or 20,000ha. They examine the effect of continuing afforestation at the current rate, which will achieve the objective in about 30 years and at twice the rate, for a range of secondary objectives. None of the expansion options show a positive return on investment although it is possible that a scaled down approach based on Option 13, (Existing Rate, Access), may do so in the specific circumstances of high population density and lack of access to public open space for informal recreation. Nevertheless the responses to consultation confirm a strong preference for further forest expansion although the reasons vary and include all the options tested. Underlying the reasons it is likely that there is a general concern for protecting the global environment and a wish to make some contribution locally to compensate for continuing strong demand for timber and paper products. Beyond that there is a concern to protect the economic interests of farmers and the wood processing industry. Despite the high opportunity cost of land, agricultural policy suggests that there is no

scarcity of agricultural produce and consequently no pressing need to retain land in agricultural use. Consequently afforestation should continue within the limits of public finance.

Expansion at current rates is less costly than expansion at enhanced rate (compare environmental Options 10 with 14, and timber Options 11 with 12). At current rates, Option 16 (Fuelwood) and Option 11 (Timber production) are the least cost options, because both offer a prospect of value added from wood processing. The Fuelwood option is attractive because the value added occurs early in the life of plantations compared with conventional forestry. It complements the timber production options for existing forests by substituting new resources for the scarcer but more versatile resources from sawmill co-products and conventional plantations. As energy policy is set to increase our need for renewable sources of energy and we have very few options in NI after exploiting wind, further afforestation specifically for fuel production is worthwhile. However there are important caveats. The additional wood supplies should not displace markets for existing timber and there needs to be a strategic decision that the capacity for existing forests to increase production should be retained against a hope of obtaining increased value added opportunities in future. In addition, the new energy plantations should satisfy the environmental constraints on forestry.

Expansion for timber production should also continue (Option 11) to ensure that there will be options for future wood based development. The timber expansion option also offers general improvements in the quality of the environment. This is because once the option to expand forests is exercised (and thereby incur the opportunity cost of removing land from agriculture) then there are valuable benefits to be obtained from future wood processing opportunities when the trees are finally harvested. Afforestation for timber production should take place where it consolidates existing forests to secure efficiency improvements and build capacity, and is in areas of poor agricultural performance to minimise the opportunity costs. The dominant species should continue to be Sitka spruce, supplemented by additional species as required by codes of practice to enhance the quality of the environment.

Over half of current planting (Option 10) takes place for environmental reasons. It is widely dispersed and is intended to address the general and widespread concern about lack of trees and scarcity of native species. It rarely addresses more specific environmental objectives of consolidating particular types of native woodland habitat. There is therefore scope to modify strategy to secure more specific environmental objectives and improve value for money. There is some anecdotal evidence that the property value of farms and rural dwellings increases if a modest

quantity of planting takes place but few indications of the magnitude of this. While most woods are planted with environmental objectives in mind and this is the main benefit of converting agricultural land to woodland, at some point there will be an opportunity to realise an economic value from the timber. At that point, the importance of the value added factor indicates that even when trees are planted for environmental reasons it is worth taking due care to ensure that when trees reach maturity there should be an option for future generations to harvest and add value to the timber. Where afforestation is for general improvement of the environment as distinct from the specific requirements of Habitat Action Plans, and this indicates a preference for native trees, then quick growing species such as ash are preferred where the land is of sufficiently good quality. This will require care in selecting suitable planting stock and care in tending plantations to produce trees that are straight and are free of timber defects.

### *10.6 Integration of forestry and farming*

When it is important that the land continues to provide an annual short-term income then the least cost way of achieving this is through agro-forestry (Option 15). At high discount rates this is the second cheapest option, but at low discount rates it has the same cost as the current programme.

#### Conclusion

14. **Forest expansion should continue at existing rates because of the strong support for tree planting as a measure to improve the environment and to provide access opportunities for urban populations. This recommendation should be reviewed if the opportunity cost of land changes significantly.**

15. **Where tree planting takes place it should also offer an opportunity to add value, for example through fuel or timber production, or complement existing farming activity.**

# 11 Implementation

## *11.1 Priorities and Finance*

The 15 conclusions set out in Section 10 are not of equal priority because of differences in the scale of impact and because of timing. There are high priority conclusions for the general approach to forest policy, and in each of the specific areas of timber provision, the environment, and access and forest expansion.

The high priority conclusions for existing forests are 1 (adding value to timber), 3 (reducing the costs of growing trees), 6 (retaining capacity for increased production), 7 (developing changes to silvicultural practice), 9 (monitoring environmental diversity), 11 (improving the quality of the forest environment) and 13 (rationalising access facilities).

Medium priorities are 4 (a regulatory framework for forests in private ownership), 10 (restoration of some forests to a pre-forest condition), and 12 (separation of responsibility for policy and delivery of public forest access). This is because these areas tend to be more contentious, and time will be needed to consult, draft primary legislation and make sure that financing arrangements are in place before achieving effective change. In the interim preparatory work can begin.

Lower priority conclusions are 2 (consider risk transfer to wood processors), 8 (encouragement of timber production from privately owned plantations). This is because there is no market opportunity at present to transfer risk through sales of timber cutting rights due to very low profitability and lack of capital in the processing sector, and the small scale of the private forestry sector. There is scope to continue work on closer integration between the Forest Service and timber processors by renewing medium term contracts for the supply of timber. These contracts link the price paid to the Forest Service with the sales performance of the Forest Service's largest customer, subject to safeguards, and mean that there is greater prospect for profit sharing than was the case under the previous tender system. It has also allowed both the Forest Service and the timber processors to programme activity much more efficiently and eliminate areas of double working. There is also much preparatory work to be done to reduce costs in forestry, to prepare a robust and cost effective regulatory framework, and to encourage further value added opportunities in wood processing. This will strengthen demand for NI timber over that of other forestry regions in the British Isles and will affect the market value of plantations. There may be a minor opportunity to dispose of some public sector plantations which are unimportant for timber production or public access, but there are risks

that the land may be reclaimed for agriculture and neglected following harvesting unless the regulatory mechanisms are in place first.

Taken together, these recommendations will initially increase public expenditure from £13 million to about £15 million as DRC and Programme expenditure(see Table 14). Some of this will be capital investment designed to produce savings in future years (for example on Information Technology and forest infrastructure) and there will be offsetting receipts and savings identified in the course of preparing an implementation plan. Annex 7: Arrangements for financing, management, monitoring and post project evaluation) gives additional information by recommendations. There will be additional costs for DoE (EHS) advising the Forest Service, and for Roads Service in repairing damage caused by timber haulage on minor county roads.

The two recommendations for forest expansion (14 and 15) are both high priority, and are likely to increase expenditure from £3 million to £5 million per year. This will be offset by EU funding for eligible afforestation and in the long term by reduced support for agriculture. In 1995 the capitalised value of this support was estimated at between 60% and 75% of the market value of agricultural land (DARD economists). Where afforestation takes place by private landowners then public sector financing often reflects the value of agricultural income forgone spread over 10 or 15 years, in addition to reimbursing most of the costs of establishing plantations. Where afforestation is by the public sector then financing is concentrated into the few years around acquiring land and establishing plantations.

**Table 14: Projected expenditure by conclusions, £ million.**

| Year | Conclusion and priority 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | High | Lower | High | Medium | High | High | High | Lower | High | medium | High | Medium | High | High | High | |
| 2001/02 | | | | | £ 10.04 | | | | | | | | | £ 3.10 | | **£ 13.14** |
| 2002/03 | | | | | £ 10.04 | | | | | | | | | £ 3.21 | | **£ 13.24** |
| 2003/04 | £ 0.05 | | | | £ 10.04 | £ 0.30 | £ 0.20 | | £ 0.05 | £ 0.05 | £ 0.10 | | £ 0.10 | £ 3.27 | £ 0.20 | **£ 14.36** |
| 2004/05 | £ 0.05 | | | | £ 10.04 | £ 0.20 | £ 0.20 | | £ 0.05 | £ 0.05 | £ 0.10 | | £ 0.20 | £ 3.39 | £ 0.40 | **£ 14.67** |
| 2005/06 | £ 0.05 | | | | £ 10.04 | £ 0.10 | £ 0.20 | | £ 0.05 | £ 0.10 | £ 0.10 | £ 0.10 | £ 0.20 | £ 3.45 | £ 0.60 | **£ 14.98** |
| 2006/07 | £ 0.05 | | | £ 0.10 | £ 10.04 | £ 0.10 | £ 0.20 | | £ 0.05 | £ 0.10 | £ 0.10 | £ 0.10 | £ 0.20 | £ 3.76 | £ 0.80 | **£ 15.59** |
| 2007/08 | £ 0.05 | £ 0.10 | | £ 0.10 | £ 10.04 | £ 0.10 | £ 0.20 | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | £ 0.20 | | £ 3.65 | £ 1.00 | **£ 15.78** |
| 2008/09 | £ 0.05 | £ 0.10 | -£ 0.20 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | £ 0.20 | | £ 3.68 | £ 1.00 | **£ 15.32** |
| 2009/10 | £ 0.05 | £ 0.10 | -£ 0.20 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | £ 0.20 | | £ 3.71 | £ 1.00 | **£ 15.35** |
| 2010/11 | £ 0.05 | £ 0.10 | -£ 0.30 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | £ 0.20 | | £ 3.78 | £ 1.00 | **£ 15.31** |
| 2011/12 | £ 0.05 | £ 0.10 | -£ 0.30 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | | | £ 4.06 | £ 1.00 | **£ 15.40** |
| 2012/13 | £ 0.05 | | -£ 0.30 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | | | £ 4.15 | £ 1.00 | **£ 15.39** |
| 2013/14 | £ 0.05 | | -£ 0.30 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | | | £ 4.23 | £ 1.00 | **£ 15.46** |
| 2014/15 | £ 0.05 | | -£ 0.30 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | | | £ 4.27 | £ 1.00 | **£ 15.50** |
| 2015/16 | £ 0.05 | | -£ 0.30 | | £ 10.04 | £ 0.10 | | £ 0.10 | £ 0.05 | £ 0.10 | £ 0.10 | | | £ 3.22 | £ 1.00 | **£ 14.45** |

### *11.2 Management*

The 15 conclusions should now be agreed by Ministers and become the basis for a Statement of Forest Policy and development of a forestry strategy for the next 10 years or so. The Statement of Policy should be drafted in the first instance by the Forest Service and cleared in the usual manner between Departments. Several Departments have an interest in how a strategy for implementing policy develops. The strategy should be cleared through an interdepartmental forestry group under DARD chairmanship representing, DFP, DRD (for Roads Service, Water Service[25], Regional Planning), DoE (for Environment and Heritage Service), and DETI (for INI, energy and tourism).

The strategy will represent a modernising of the approach to forestry in NI. It will need to include further investment in IT for the Forest Service so that information about trees, their location and access can be effectively communicated to the wood processors and used to monitor environmental performance. Parts of this work are in progress through acquisition of a Geographic Information System. It is also probable that administrative savings can be achieved and efficiency improved by transferring the Forest Service Headquarters function from Dundonald House to the main area of forestry activity, but new accommodation will be required. There will need to be further modernisation of Forest Service staffing arrangements through harmonisation of arrangements for pay and conditions of service, particularly between the industrial and non-industrial groups of staff, and a modest increase in professional and technical capacity. This will bring in new skills and allow effective implementation of the strategy, leading to more efficient working arrangements and provide greater scope for developing and retaining skill and knowledge within the industry.

The key documents to be prepared are a statement of Forest Policy, to be prepared once necessary consultation on Equality Impact Assessment is concluded, and a strategy for implementing the policy. As the EIA should reflect the direction that policy will take it cannot issue until this Appraisal is agreed. The strategy should be available for autumn 2003 to facilitate budgeting and business planning for 2004/05. It will also map out the legislative process to secure necessary changes to the Forestry Act.

Overall responsibility lies with DARD.

[25] Water Service own 4500 ha of land managed by Forest Service

### *11.3 Monitoring*

Responsibility for monitoring lies with the Forest Service. The thrust of the forestry strategy will be to provide sustainable forest development. A set of 40 forestry indicators[26] grouped under six themes of Woodland, Biodiversity, Condition of Forest and Environment, Timber and other Forest Products, People and Forests, and Economic Aspects have been produced at UK level. Monitoring will seek to establish NI baseline data on as many of these as possible in time for the next full assessment of the indicators planned for 2005. The Forest Service will also report on progress towards implementing individual annual targets in support of the aims of the strategy in its Annual Report and Accounts.

### *11.4 Evaluation*

Responsibility for evaluation lies with the Forest Service. The Forest Service will review the effectiveness of the main elements of the strategy by March 2009, and make further recommendations about the direction of forest policy. The review will test the continuing validity of the underlying assumptions particularly in relation to the costs of land, growing timber and timber-sales, the value added to timber in Northern Ireland, the use made of forests by people, and the contribution that forests make to biological diversity.

[26] UK Indicators of Sustainable Forestry, published by Forestry Commission and Forest Service, and available from Economics and Statistics Unit, Forestry Commission, October 2002

**Annex 1: Tables**

# Apportionment of Forest Service expenditure to activities, 2001/02 (%)

**Table 15: Apportionment of expenditure on activities to objectives: District Forest Officers assessment (%).**

| | Protection and improvement | Establishment | Re-establishment | Christmas trees | Commercial Recreation | Non commercial recreation | Grants and Authority | Harvesting |
|---|---|---|---|---|---|---|---|---|
| Economy | 60 | 55 | 55 | 90 | 80 | 35 | 20 | 70 |
| social | 15 | 15 | 15 | 10 | 15 | 55 | 25 | 10 |
| Environment | 25 | 30 | 30 | 0 | 5 | 10 | 55 | 20 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

**Table 16: Apportionment of total expenditure (%) to objectives.**

| | Protection and improvement | Establishment | Re-establishment | Christmas trees | Commercial Recreation | Non commercial recreation | Grants and Authority | Harvesting | FS TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| economy | 10% | 3% | 12% | 2% | 2% | 4% | 3% | 16% | 51% |
| social | 3% | 1% | 3% | 0% | 0% | 7% | 4% | 2% | 20% |
| environment | 4% | 1% | 9% | 0% | 0% | 1% | 9% | 5% | 29% |

For comparison
89% of FS land use is classified as coniferous high forest.
8% is classified as conservation forest, broad-leaved high forest or amenity woodland.
0.5% is classified as recreation forest.
2% is waiting replanting.

## Expenditure by activities

**Table 17: Forest Service expenditure and receipts (£ Million) by activities and apportionment to objectives.**

| | Expenditure | | | | **Income** | Deficit |
|---|---|---|---|---|---|---|
| | economy | social | Environment | **Total** | | |
| Protection and improvement | 1.3 | 0.3 | 0.5 | **2.1** | | 2.1 |
| Establishment | 0.3 | 0.1 | 0.2 | **0.6** | | 0.6 |
| Re-establishment | 1.6 | 0.4 | 0.9 | **2.9** | | 2.9 |
| Christmas trees | 0.2 | | | **0.2** | **0.1** | 0.1 |
| Commercial Recreation | 0.3 | | | **0.3** | **0.3** | |
| Non commercial recreation | 0.5 | 0.9 | 0.2 | **1.6** | **0.3** | 1.3 |
| Grants and Authority | 0.5 | 0.6 | 1.4 | **2.5** | | 2.5 |
| Harvesting | 2.0 | 0.3 | 0.6 | **2.9** | **4.0** | (1.1) |
| **FS TOTAL** | **6.7** | **2.6** | **3.8** | **13.1** | **4.7** | **8.4** |
| Other Income | | | | | 0.2 | |
| % of FS total | **51%** | **20%** | **29%** | 100% | | |
| % of FS total excluding grants and authority | **58%** | **19%** | **23%** | | | |

**Table 18: Of which, managing existing forests (£ million)**

| | Expenditure | | | | Income | Deficit |
|---|---|---|---|---|---|---|
| | economy | social | Environment | Total | | |
| Protection and improvement | 1.3 | 0.3 | 0.5 | 2.1 | | 2.1 |
| Re-establishment | 1.6 | 0.4 | 0.9 | 2.9 | | 2.9 |
| Christmas trees | 0.2 | | | 0.2 | 0.1 | 0.1 |
| Commercial Recreation | 0.3 | | | 0.3 | 0.3 | |
| Non commercial recreation | 0.5 | 0.9 | 0.2 | 1.6 | 0.3 | 1.3 |
| Harvesting | 2.0 | 0.3 | 0.6 | 2.9 | 4.0 | (1.1) |
| | 5.9 | 1.9 | 2.2 | 10.0 | 4.7 | 5.3 |

**Table 19: Managing future forests (£ million)**

| | Expenditure | | | | Income | Deficit |
|---|---|---|---|---|---|---|
| | Economy | Social | Environment | Total | | |
| Establishment | 0.3 | 0.1 | 0.2 | 0.6 | | 0.6 |
| Grants and Authority | 0.5 | 0.6 | 1.4 | 2.5 | | 2.5 |
| FS TOTAL | 0.8 | 0.7 | 1.6 | 3.1 | | 3.1 |

Annex 2: Indicators of Sustainable Forestry

| | |
|---|---|
| A. Woodland | Al. Woodland area<br>A2. New woodland creation<br>A3. Loss of woodland<br>A4. Tree species<br>A5. Woodlands in landscape<br>A6. Area of sustainably managed woodland<br>A7. Management practices |
| B. Biodiversity | B1. Ancient woodland<br>B2. Native woodland area<br>B3. Native woodland condition<br>B4. Abundance of fauna<br>B5. Richness of flora<br>B6. Diversity of woodland within a stand.<br>B7 Natural regeneration of woodland |
| C. Condition of forest and environment | Cl. Air pollutants<br>C2. Soil chemistry<br>C3. Water quality<br>C4. Surface water acidification<br>C5. Water yield and stream flows<br>C6. River habitat quality<br>C7. Pollution incidents<br>C8. Crown density<br>C9. Damage by living organisms<br>C IO. Other damage (wind and fire) |
| D. Timber and other forest products | D 1. Volume of growing stock<br>D2. Harvesting compared with annual increment<br>D3. Timber production and future availability<br>D4. Home-grown timber as % of consumption<br>D5. Carbon storage |
| E. People & Forests | El. Visits to woodland<br>E2. Extent of open public access<br>E3. Public awareness<br>E,4. Community involvement<br>E5. Historic environment and cultural heritage<br>E6. Health & safely |
| F. Economic aspects | F I. Financial return from forestry<br>F2. Value added in forestry<br>F3. Value added in wood processing<br>F4. Employment<br>F5. Social & environmental benefits |

**Annex 3: Costing Information**

| **Unit costs** *(inflation adjusted)* | | **97-98** | **98-99** | **99-00** | **00-01** | **01-02** |
|---|---|---|---|---|---|---|
| Maintenance | £ per ha managed | 42.53 | 46.76 | 40.63 | 34.92 | 33.66 |
| Establishment | £ per ha planted (within 5 year band) | 476.51 | 536.77 | 627.04 | 614.68 | 824.45 |
| Re-establishment | £ per ha replanted (within 5 year band) | 767.19 | 575.63 | 619.97 | 683.70 | 737.98 |
| Christmas trees | £ per Christmas tree sold | 24.86 | 26.49 | 20.27 | 24.42 | 30.60 |
| Commercial recreation | £ per caravan / tent night | 12.89 | 16.92 | 11.61 | 7.27 | 4.63 |
| Non commercial recreation | £ per paying day visitor | 2.11 | 4.07 | 3.47 | 4.89 | 4.63 |
| Grants | £ per £ of grant paid (rebased in 00) | 0.43 | 0.34 | 0.14 | 0.15 | 0.14 |
| Authority | Total | 555,588 | 480,302 | 571,310 | 597,421 | 424,845 |
| Harvesting | £ per hectare sold | 7,639 | 5,135 | 4,337 | 3,081 | 2,739 |
| Harvesting | £ per m3 timber sold | 17.40 | 13.10 | 9.79 | 7.46 | 6.96 |

**Annex 4: Non-monetary considerations.**

# Weighing up non-monetary costs and benefits

## *Matrix or "impact statement": options and impact*

### 1. Option: No net cost

Impact Forests will be perceived as being managed un-sustainably. The impact is partially monetary, for example through increased difficulty in marketing timber; loss of confidence and reduced value added opportunities in the timber industry. This is dealt with under "risk" below. Other impacts are:

| Economy: | Environment | Society |
|---|---|---|
| Not sustainable.<br>Reduced tourist activity as forests show neglect. | Reduced landscape quality, access to archaeology and carbon sequestration.<br>Increased nuisance to neighbours from wildlife and deteriorating drainage.<br>Gains in biodiversity conservation and water quality. | Reduced access to the countryside for informal recreation and organised sports.<br>Reduced provision for environmental education and social development.<br>Increased timber theft, illegal grazing and fire. |

### 2. Option: Reduced maintenance

Impact Forests will be perceived as being managed un-sustainably. The impact is partially monetary, for example through increased difficulty in marketing timber; loss of confidence and reduced value added opportunities in the timber industry. This is dealt with under "risk" below. Other impacts are:

| Economy: | Environment | Society |
|---|---|---|
| Not sustainable | Reduced landscape quality and carbon sequestration.<br>Increased nuisance to neighbours from wildlife and deteriorating drainage.<br>Gains in biodiversity conservation and water quality. | Reduced access to the countryside for informal recreation and organised sports.<br>Reduced provision for environmental education and social development.<br>Increased timber theft, illegal grazing and fire. |

### 3. Option: Reduced production

| Economy: | Environment | Society |
|---|---|---|
| Increased cost to industry in sourcing alternative supplies. | Gain in biodiversity.<br>Gain in carbon storage. | Neutral |

### 4. Option: Reduced access

The UK standard on sustainable forest management (the UK Woodland Assurance Standard) requires owners to provide at least informal access opportunities. A failure to do so places the status of woodlands at risk and may increase the difficulty of marketing timber.

| Economy: | Environment | Society |
|---|---|---|
| Loss of tourism benefits in forestry areas. | Improved efficiency of forest management by focusing design only at landscape scale.<br>Gain in biodiversity and archaeology through reduced disturbance. | Significantly reduced access to the countryside for informal recreation and organised sports.<br>Reduced provision for environmental education and social development. |

### 5. Option: Reduced care

Reducing the emphasis on environmental objectives to the minimum needed to comply with legal obligations. Not considered further (see description of option on page 20).

**6. Option: Increased production**

| Economy: | Environment | Society |
|---|---|---|
| Improves confidence throughout supply chain. | Gain in landscape and biodiversity by structural change to forests.<br>Reduced water quality. | Reduced quality of minor rural roads. |

**7. Option: Increased Tourism**

| Economy: | Environment | Society |
|---|---|---|
| Increased tourist activity in and around forests | Neutral | Improved access to forests. |

**8. Option: Improved access**

| Economy: | Environment | Society |
|---|---|---|
| Some employment in service industries outside the normal forestry areas. | Improved biodiversity and landscape of peri-urban areas. | Increased relevance of forestry to most people.<br>Improved access to exercise opportunities.<br>Improved physical and mental well being. |

**9. Option: Environmental enhancement**

Measure Demonstrating sustainability of forest management through a process of independent verification and certification,

| Economy: | Environment | Society |
|---|---|---|
| Improved market access for 7% of forest area and most private growers. | Gain in environment qualities from application of higher standards of management. | Improved opportunities for recreation and access. |

Measure Improving biodiversity,

| Economy: | Environment | Society |
|---|---|---|
| | Small gains in diversity of landscape.<br>Gain in biodiversity through habitat restoration and conservation. | Neutral |

Measure Promoting energy conservation through the use of wood as a fuel and making forest sites available for wind turbines, and

| Economy: | Environment | Society |
|---|---|---|
| Creates new markets and gives value to low quality plantations. | Contributes to sustainable energy strategy. | Increases the viability of family farm holdings. |

Measure Promoting the use of wood as an energy efficient construction material.

| Economy: | Environment | Society |
|---|---|---|
| Reduces the cost of energy by reducing demand. | Contributes to sustainable development | Neutral |

**10. Option:Current Expansion**

| Economy | Environment | Society |
|---|---|---|
| Small Gains | Gains in biodiversity, water quality and landscape | Small gains |

**11. Option:Existing Rate, Timber Production**

| Economy | Environment | Society |
|---|---|---|
| Sustains confidence throughout timber industry supply chain. Contributes to sustainable development | Gains in biodiversity, water quality | Small gains |

**12. Option: Enhanced timber production**

| Economy: | Environment | Society |
|---|---|---|
| Improves confidence throughout timber industry supply chain. Contributes to sustainable development in the long term. | Gain in biodiversity and water quality because of afforestation of improved grassland. Increased carbon sequestration | Small gains |

**13.Option: Existing Rate access**

| Economy: | Environment | Society |
|---|---|---|
| Increased tourism activity in and around forests. | Gain in landscape, biodiversity, archaeology and cultural heritage. Increased carbon sequestration. Reduced atmospheric pollution and noise. Greenbelt reinforcement. | Increased opportunity for regular access to public open space. Increased physical and mental well being. Increased opportunity for community participation. Increased property values. |

**14.Option: Expanded environment**

| Economy: | Environment | Society |
|---|---|---|
| Contribution to sustainable development. | Gain in biodiversity. Gains in water and landscape quality. | Minor gains |

**15.Option: Farm integration**

| Economy: | Environment | Society |
|---|---|---|
| Neutral | Gain in biodiversity, landscape and water quality. Contributes to sustainable energy strategy. | Contributes to sustaining farming communities. |

**16. Option: Fuel wood**

| Economy | Environment | Society |
|---|---|---|
| Neutral | Gains especially on water quality | Neutral |

**Annex 5: Consultation**

# Summary of responses to the consultation paper

## *INTRODUCTION*

The consultation paper “Forestry in Northern Ireland” was published on 24 June 2002. A total of 90 organisations nd individuals responded. This represents 16% of those individuals and organisations that were directly issued with the consultation paper by the Forest Service.

A wide variety of interests responded; architectural and historical, community groups, district councils, educational, forestry contractors, government departments, land owners and managers, nature conservation, professional institutions and associations, recreational groups, "Section 75" groups, timber and wood, and trade unions.

## *SUMMARY OF RESPONSES*

### General

Many, but not all, respondents commented on every question and policy recommendation. Therefore some analysis is based on fewer responses than others are. In addition as a number of the questions and policy recommendations throughout the consultation paper were inter-related, references to the responses on these issues may appear in a number of the following paragraphs.

### Need for policy review

There was broad welcome expressed for this review and for the opportunity to contribute to it.

### Key issues raised in the consultation paper

The consultation paper sought answers to a total of 34 questions and made 28 policy recommendations. These centred mainly on the scope of forest policy and the strategic issues and principles that might guide policy. The paper also sought views on where the balance and focus of forest management and development should lie in terms of economic, social and environmental emphasis, both in relation to existing forests and forest expansion.

There was general concurrence with these key issues for forestry development. A significant number of respondents challenged what they considered to be a disproportionate emphasis given to the economic outputs of forestry, through timber production and insufficient recognition of the

social and environmental attributes of forests, which many argued were at least of equal importance.

In particular there was broad support for the paper's recommendation that sustainability in management and development should underpin forest policy.

### Scope for developing forest policy.

The paper emphasised the crosscutting nature of forest policy and concluded that there was a need to agree the scope of forest policy between departments and define responsibilities for delivery of the agreed policy. The paper also drew attention to different definitions of the term "forestry". The Forestry Act (Northern Ireland) 1953 did not define forestry and administrative definitions had been developed over time. The paper adopted the land use definitions used by the United Nations Food and Agriculture Organisation which cover "forest", other wooded land", and "trees outside the forest".

A majority of those organisations that responded on this issue were of the view that forest policy should be extended to include "trees outside the forest". This would widen the policy by a very considerable margin.

### Securing a competitive economy/industry development.

There was a strong consensus that the delivery of regional development opportunity should be the main or a key policy aim of most forests. The vast majority of respondents asserted that such should best be achieved by attaching at least equal priority and focus to the development of economic, social and environmental forestry programmes. There was also a general belief expressed that forests could make a much greater contribution to the promotion and development of tourism, especially in rural areas.

Respondents directly associated with the wood processing industry strongly advocated the need to effect investment in saw mill co products and residues as a key to industry development. The importance of developing and facilitating clustering of all key stakeholders engaged in Northern Ireland in the supply of raw material through to end user was underlined. The development of co-operation with forestry bodies in the RoI and Scotland was also advocated by some.

There was a belief expressed from many quarters that much greater emphasis and focus be attached to the establishment of markets for locally produced timber, especially for high value

hardwood, including specialist products. A co-ordinated campaign to promote and market much more successfully the virtues of locally grown certified softwood in building construction was also advocated by some respondents.

### Forest replacement and expansion.

There was widespread support for a significant increase in tree cover in Northern Ireland of at least up to the levels existing in Great Britain and the RoI.

There was belief that that too much emphasis was being attached to productive forestry and the commercial exploitation of conifer planting.

The much greater planting of broad-leaved and native species particularly targeted at the rehabilitation of ancient woodland and increasing biodiversity benefits generally was widely advocated.

There was support for a clear future afforestation and deforestation policy within the context of a strategic land use plan.

From an industry perspective guarantees of supply of future raw material needs were required.

An increase in support for the production of energy crops was advanced by a number of respondents.

A significant increase in urban and community forests was strongly advocated across all categories of respondents.

### Protection and enhancement of the environment

There was recognition by respondents of the need for improved environmental protection and enhancement in the formulation of forest policy and delivery of programmes. Greater emphasis on new planting of and regeneration of native species, habitat improvement and links to biodiversity was articulated generally.

There were strong calls from a significant number of respondents to review the need for felling licences.

### Forest attractions/visitor experience

There was general consensus that a range of attractions and experiences should be available to attract visitors to forests, varying from peaceful enjoyment of a quiet visually pleasing environment, with more broad-leaved sites to facilities that encouraged exercise and sporting activities. Many advanced the need for increased interpretative information and guidance for visitors generally.

A strategy that addressed areas of recreation conflict was advocated by a number of respondents.

The promotion of forest based attractions linked to rural tourism development was widely supported.

### Access to state and private forests

There was universal consensus that public access to all forests should be encouraged.

On the issue of a possible "public right" of access to forests respondents were generally of the view that such was not realistic in the private sector, especially in the absence of effective incentives and existing perceptions and concerns surrounding public liability risks.

Barriers to access to state forests centred on distance of travel and transportation.

Some considered that charging was as a dissuading factor to access, but the majority of respondents expressed the opinion that sensible levels of charging, linked to the extent of facilities and services on site, including car parking were appropriate.

Concession charging for appropriate user groups in line with social inclusion policies was supported as a means of encouraging access.

### Use of forests for public education.

There was strong support for the promotion of forest based education, not only for children, but also for the wider public on environmental issues and sustainable development.

Respondents were generally of the view that responsibility for such education should at least be shared between Forest Service, the Department of Education, Education and Library Boards and other partners in the forest sector. A number of respondents considered that Forest Service should be much more proactive or even assume a "lead" role in this area.

## Training and research in the forestry sector.

There was significant support for the provision of effective and broadly based research and skills development in Northern Ireland to strengthen the contribution forestry can make to the economy, social development and the environment, including renewable energy. The importance of drawing on relevant research being undertaken elsewhere was recognised. The need for the forest industry to have a training facility in Northern Ireland was supported. A number of respondents were of the view that delivery of training might be more sensibly undertaken through the Department's agricultural colleges.

## Options for implementing policy.

Respondents supported the view that the private sector should become more responsible for delivering economic benefits of forests. There was little support for the private sector's increased involvement in the delivery of the wider social and environmental benefits.

Respondents were strongly in favour of participation by local authorities in delivering public benefits from forests.

On the issue of grant aid there were some calls for a review of the grant aid arrangements to promote private planting or for the targeting of aid to maximise economic, social and environmental benefits.

**Annex 6: Risk**

# Appraising risk and uncertainty in a forestry programme.

## *Main risks*

The challenge for the forest and wood products industry is to match the availability of forest resources with the demand for forestry products and services at a price that adequately covers the costs of production. The main costs are the opportunity cost of land for forestry, the cost of regenerating and maintaining forests after planting, and the cost of new planting for forest expansion. The main benefits come from the sale of timber (which is the product of price and volume) and value added in wood processing. Other benefits include tourism, and environmental and social benefits.

The main risks to the availability of forest resources stem from the long period between planting trees and the time taken for the trees to become large enough to produce benefits. During the lifetime of a tree the climate is likely to change, and damage will occur because of storms and forest fires. However experience also suggests that forests are inherently robust because they are widespread and there is diversity of age and species. So long as the important controls are in place at vulnerable periods in their development, most forests will survive to maturity and regenerate.

Over the lifetime of a forest the relative demand for forest products is likely to change in line with the discovery of new approaches to manufacturing and fashion, and the value we place on the use of natural resources. Similarly, individual businesses tend to have a life measured as a fraction of the life of trees, after which a new approach to manufacture, marketing and business management is required. These risks are grouped in terms of impact of climate and climate change; threats to the environment and the likely impact of changing environmental values; changes to silvicultural practice; the prevailing economic, political and fiscal background; and threats to law and order. The analysis only considers the potential impact of risks that are likely to be widespread and long lasting, along with mitigating actions and potential for risk transfer.

The quality of the available data is variable. The financial data is derived from the audited Forest Service accounts over several years and they have been used to derive unit costs. The data on visitor figures are derived in part from tickets issued for admission to forests. These produce generally reliable estimates of use for charged areas. However the estimates of visits to uncharged areas reflect the frequency with which foresters could visit sites and their individual assessment of use. These estimates were not applied in a standard manner and inferences should be treated with

care. For example, several sites show low estimated usage compared with other sites which appear to be otherwise similar in terms of population living in the area and the nature of the forest. Significant underestimates are possible.

### *Risk due to Climate and climate change*

Forests are damaged by storms every year, causing localised uprooting of mature trees and damage to forest paths and roads through flooding. NI has very limited areas of old trees and these are likely to be progressively depleted. Every 20 or 30 years there is a storm that causes widespread damage. The one of Christmas 1998 blew down the equivalent of one year's production and took four years to salvage.

The United Kingdom will become warmer in future[27]. High summer temperatures will become more frequent and very cold winters will become increasingly rare. Winters will become wetter, and heavy winter precipitation will become more frequent. By 2080 the NI annual mean temperature change is likely to be between $1^0$C and $3^0$C warmer, mostly as a result of warmer summers, and winter rainfall is likely to increase by 0-25% with the greatest increase in the east. There are no reliable estimates of changes in wind speed. There is a significant degree of confidence about the direction of forecast change; the uncertainty is around the magnitude of change. Although the impact on forestry can not be determined with certainty, the changes now in progress will have an impact within the lifetime of most existing plantations.

### Impact.

After the 1998 storm timber prices weakened by 30% chiefly because of increased supply, although the fact that trees were damaged and that salvage would be difficult and potentially hazardous had an effect. Industry gained from increased supplies at reduced prices. The impact on the environment was to reduce age and species diversity. The overall impact on access was locally severe and increased the costs of repair and maintenance. Visitor numbers decreased in affected forests while access was restricted, but has improved since repairs were made.

In future, increasingly moist conditions, longer growing seasons and reduced light intensity will favour coniferous tree species particularly in the western parts of NI. There is uncertainty about soil moisture in the east of NI; drier summer conditions would favour broad-leaved species and those conifer species that produce redwood timber. The shelter offered by forests will become

[27] Climate Change Scenarios for the United Kingdom, Briefing report by Mike Hulme, John Turnpenny and Geoff Jenkins, published by Tyndall Centre for Climate Research, School of Environmental Scviences, University of East Anglia, Norwich, UK. (Met Office web-site)

relatively more attractive for outdoor recreation particularly in winter, but will require a higher standard of design, repair and maintenance. The climate changes are likely to increase the difficulties for agriculture and increase the relative attractiveness of forestry. The change will be most evident on poorly drained soils and flood plains. The conditions are likely to favour the temperate Atlantic forest types found in NI. Climate change may also favour the spread of new pests and diseases to NI, and encourage some existing ones such as aphids. Some potential invaders present a serious threat to forests in Europe.

The impact of climate change may be to increase costs, but there is scope to introduce compensating measures. The assumed risk of incurring increased costs due to climate and climate change is **Low**.

### Mitigation

The risk of damage to forests storms of average intensity by is mitigated by applying good silvicultural practice, by identifying and planning the harvest of the most “at risk” sites in good time, and by setting limits of acceptable damage before intervention. The costs of salvage and risk of injury to forestry workers are reduced through mechanisation. Professional judgement balances the risk of incurring damage and securing the best yield of timber from individual forests in determining the timing of harvest. In addition a cycle of felling and replacement, augmented by new forests ensures diversity of age and species. Programmes of inspection of recreation facilities identify damage and initiate timely repairs. Postponing planned maintenance and bidding for additional resources treats exceptional damage. The costing data includes the period following the exceptional storm damage of ’98 and no further allowance is made.

Climate change may precipitate some structural changes in drainage networks to handle increased peak flows, along with mitigating measures such as discharging drains into seepage zones of water tolerant trees before allowing water to enter river systems. Harvesting operations in winter are likely to become more difficult. Mitigating measures include good forestry practice and will be revised to deal with changing circumstances.

The Department maintains controls on imports of wood and bark to prevent pest introductions and has a duty to prevent the spread of disease. The discovery of new introductions can be very disruptive on trade and action has to be co-ordinated with the authorities in GB and Dublin, and with the European Commission. However climate change of itself does not increase the risk of infection; the main risk is through the movement of goods and people and is common to all options.

Overall the risk due to climate is **low**, although there will be a differential impact between options.

### Potential for risk transfer

There is little potential for transferring risk other than by transferring ownership of forests from the public sector. There will always be an expectation of public assistance in the event of even moderately widespread damage.

## *Risk to the environment and the impact of changing environmental values*

The risks arise from the damage that forestry practice might do to the environment and the impact of changing environmental values on the use of forest resources. There is concern that forest expansion will be at the expense of other important habitats.

There is widely held perception that using timber depletes forests, and therefore the use of wood is morally undesirable. Industry has introduced measures to demonstrate that the use of forests for timber production is sensible, because it places value on forests, manufacturing and building processes that use wood are kinder to the environment than alternatives, and forests are replaced following harvesting.

There are concerns about the use of chemicals as wood preservatives and insecticides that are likely to result in new restrictive legislation. This has potential to change the market for certain kinds of timber and increase the difficulty and cost of replacing forests after harvesting. Existing legislation to protect habitats and to secure improvements to water quality in particular has already led to stricter codes of practice on forestry operations.

### Impact

The potential impact is reduced demand for timber and restrictions on the land available for new forests. These issues are not unique to NI and market solutions and industry codes of practice are being developed and revised. In the short term the measures may encourage further weakening of the international price for timber, but these are not the most significant factors. Proposals to restrict the use of chemicals in forests are likely to lead to increased establishment costs for replacement forests, and extend the period taken for successful re-establishment.

The areas in which forest expansion may take place without causing an undesirable loss of habitat are now much reduced compared with the previous statement of forest policy for NI. Although the most important sites for nature conservation have been surveyed and defined, other sites still have not been comprehensively mapped. There is therefore a continuing risk that some

inappropriate planting may take place, but the overall impact is likely to be small. In contrast the emerging pressure to deal with principally agricultural inputs to the nutrient load of lakes and aquifers may increase the attractiveness of forestry as an alternative land use where no additional nutrient inputs are required. Forestry is an increasingly attractive option where there is potential to lead agricultural run-off over the surface of plantations before entering drainage systems, or in areas of intensive agriculture where removal of land from agricultural production is the best option, such as in Nitrate Vulnerable Zones.

The impact overall is **Low, subject to concerns about restricting the use of chemicals to regenerate forests, and the need to increase the scope of monitoring and reporting**.

### Mitigation

The mitigating measures to reduce the impact of environmental risks are legislation, and the introduction and monitoring of codes of practice within the industry.

## *Changes to silvicultural practice*

The dominant system of forest management in the British Isles is by clear cutting and replanting using young trees grown in a nursery. The system produces dramatic changes in forest environment and relies significantly on the use of fertiliser and chemicals to produce rapid, consistent establishment and uniform growth over a wide range of growing conditions. New thinking suggests that greater reliance should be placed on alternative systems of silviculture and use of natural regeneration to reduce the environmental impact of harvesting, to improve diversity, and reduce cost. The risk is greater variability in replacement forests, increased risk initially of damage due to storms, much longer regeneration periods, and less assurance of successful regeneration.

### Impact

Poor advice in the past led to inappropriate planting of some tree species, including poplars. This led to crop failure, sometimes after the trees were a significant size. The lesson is that the impact of changed practices is likely to be cumulative and apparent over the long term. We have not fully tested alternative silvicultural systems to determine the effect on timber yield or cost of management. This is particularly important on the most infertile exposed soils where there is a high risk of storm damage and where increasing tree size has a marked effect on commercial viability. The sustainability of alternative systems is uncertain.

Where forestry programmes rely on substantial changes in silvicultural practice the risk is **High**.

### Mitigation

While there will always be a temptation to anticipate changes in market or growing conditions, professional and public advice should be prudent and conservative, and based on a current understanding of forestry principles and practice. The risk of imprudent action can be reduced by research, by publishing advice, and by retaining professionally qualified and experienced staff in the industry. Advice is made available to the private sector in the course of administration of the grant schemes, access to Forest Service training facilities and is supplemented by qualified and experienced private sector advisors and contractors.

### Potential for risk transfer

The risk will remain with the owners of plantations, and to a lesser extent with funding bodies.

## *General economic and political background*

Over the long term there is evidence that the consumption of wood and wood products is increasing per capita world wide, and in many places is limited by supply. The risk factors are those that reduce the demand for timber generally, for example by reducing disposable income for home improvements or visits, or that increase the supply costs for home grown timber. Demand for forest visits is markedly affected by the degree of political stability evident during the summer months.

Aspects of forestry activity require the application of heavy semi-skilled manual work and increasing mechanisation particularly in timber harvesting and drainage. The supply of labour for forestry depends critically on the competitive demands of the construction industry.

The Forest Service in particular is restricted in its ability to act commercially by the status of its staff as NI Civil Servants, and the requirement to be accountable for a wide range of policy interests unrelated to commercial activity.

### Impact.

Profitability is very low due to strong demand in the UK for low cost timber supplies from Sweden, the Baltic States and semi-tropical countries. Timber is no longer harvested from private sector plantations except in exceptional circumstances. There is a risk of business failure and loss of value added opportunities in NI.

Private forest owners are unable to pay for the additional costs of social and environmental policies from timber receipts. This implies decreased care of plantations and reduced activity. Although the general outlook for agriculture is poor and might be expected to encourage an

increase in planting activity, much will depend on the nature of structural changes in agricultural support.

The risk of economic and political factors is **High**.

### Mitigation

The Forest Service has implemented a series of business improvement measures which have stabilised the supply of timber to industry, saved costs in timber transport and timber sales and procurement, and encouraged industry to focus on process improvement and marketing. The reduction in timber procurement costs has allowed manufacturers to consider new responses to fiscal measures such as energy taxation and landfill taxes, including the potential use of wood as an energy source for both process heat and electricity generation.

### Potential for risk transfer

Timber growers carry most of the long-term risk.

There may be an opportunity to transfer risk to the wood processing industry along with property rights, subject to complying with the Transfer of Undertakings for Public Employees (TUPE) and satisfying value for money considerations.

## *Law and order*

Forests are secluded places. Property is at increased risk of damage and theft, and people are at risk from criminality. The key risks are destruction of plantations by fire, theft of timber, theft from cars in forest car parks, and violence to forest users.

Loss due to fire is a frequent occurrence in some forests, and at various times has been associated with political unrest, dissatisfaction with the Forest Service as a competitor for agricultural land, and as a source of regular income for retained Fire Service and Forest Service staff. Evidence is always hard to produce. Losses are generally contained by the action of the Fire Service and Forest Service, and ultimately by rain. The long-term loss is a small reduction in the planned volume of timber available for sale and increased costs of replacement plantations. Although locally dramatic and significant, the overall risk to the policy is low.

The remoteness of forests, the value of individual lorry loads of timber and the increasing volume of movements of timber increases the risk of theft of timber.

Most forests around urban areas enjoy high use during the hours of full daylight. There are relatively few incidents, but they are secluded places and there are perceived and occaisionally real threats. The Forest Service has no data on the frequency or severity of crime in forests.

The general air of isolation and vulnerability of farms in remote areas, particularly where forests are already extensive, probably increases the likelihood that forests will expand.

Overall, the risk to forestry programmes is **Low.**

### Mitigation

The Forest Service maintains fire plans, trains its staff in fire fighting, and co-operates with the Fire Service. Suspicious circumstances are reported to the police.

The Forest Service has recently introduced an electronic method of authorising and tracking lorry movements from its forests. This is based on a system of permits and challenges, and has still to be fully tested.

**Annex 7: Arrangements for financing, management, monitoring and post project evaluation**

## Prioritised recommendations and action required

| Recommendations - General | Priority | Financing | Management | Monitoring | Evaluation |
|---|---|---|---|---|---|
| 1. The return on forestry investment should be maximised by seeking opportunities to add value through timber processing in NI. | **High**. Ongoing work on encouraging the wood processing industry to develop solutions to problem of low profitability and high cost to continue, leading to a stable processing industry base. | Private finance.<br>PE largely contained within existing provision (INI industry grants and facilitation, DARD (Forest Service) running costs and Roads Service costs. | Implementation plan to be developed autumn 2003. | Form an interdepartmental group on forests to oversee development and impact (DARD, DRD – Roads, DETI –INI, Energy)<br>Report through FS Annual Report. | TBA |
| 2. To consider the transfer of the risks of growing trees for timber to the wood processors. | **Low**. No immediate prospect of success due to very low private sector profitability. Fragmentation of the wood resource will add appreciably to industry costs and should be avoided while timber production is a priority. | Further work on feasibility and costs required. | Forest Service to keep under review and bring forward proposals to Ministers when a market opportunity exists. | | TBA |

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|---|---|---|---|---|---|---|
| | | Property may be sold if it contributes little to timber production potential because of age, scale or quality, or to public access. | This may create additional PE pressures for other agencies, including DARD as land returns to agriculture. | | | |
| 3. | To examine the ways of reducing the costs of growing trees and harvesting. | **High**. | DARD Forest Service PE estimates. | FS Business Plan 2004/05 | Report through FS Annual Report. | TBA |
| 4. | To consider introducing a regulatory framework for forests in private ownership. | **Medium**. This is a pre-requisite for risk transfer to ensure that forests are sustainably managed. | Some increase in public administration and cost, and will be a significant regulatory burden on woodland owners who see timber production as a prime objective. | FS to include in draft changes to the Forestry Act and consult. | Report through FS Annual Report. | TBA |

| Recommendations – Timber production | Priority | Financing | Management | Monitoring | Evaluation |
|---|---|---|---|---|---|
| 5. The preferred approach is to manage existing forests to deliver current levels of timber production, along side current access opportunities and environmental benefits. | **High**. FS priorities conflict and it needs clear policy direction as the basis for operational management. | Within current levels of PE for DARD Forest Service but additional unspecified PE required for DRD Roads Service to support timber movement from forest to mill. | Forest Service Business Plan; implications for Roads Service and INI to be discussed and agreed at draft budget stage. | Report through FS Annual Report. | TBA |
| 6. The capacity for increasing timber production should be retained as a strategic asset of the NI economy. | **High.** | Within current levels of PE for DARD Forest Service. | Forest Service Business Plan. Use of reserve to be the subject of specific clearance in business plan. | Report through FS Annual Report. | TBA |
| 7. Action should be taken to investigate and implement the most promising techniques of silviculture to secure a significant reduction in the costs of managing plantations. | **High** | Needs investment in R&D to effect change. Likely solution is to use an existing forest as a base for R&D. Some investment in temporary accommodation, professional staff, and £0.2 million/year. | Forest Service Business Plan. | Report through FS Annual Report. | TBA |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8. | The production of timber from privately owned plantations should be encouraged through public support for restocking and thinning plantations, subject to compliance with rules on competition within the Single European market. | **Low** | The volume of timber supplied will always be insignificant and is not an efficient use of public resources because of the administrative costs of small-scale programmes.<br>Increase in PE through DRC and grants (currently using EU Structural funds) of the order of £100k annually. | Forest Service in consultation with representatives of forest owners and timber processors. This will be an effective vehicle for transferring public sector forestry knowledge and skills to the private sector over a realistic time. | Report through FS Annual Report. | TBA |

| Recommendations - Environment | Priority | Financing | Management | Monitoring | Evaluation |
|---|---|---|---|---|---|
| 9. Arrangements should be put in place to monitor and report on the diversity found within the NI forest environment. | **High** | Increased DARD & EHS PE £0.2 annually. | Joint Forest Service and EHS. | Report through FS Annual Report. | TBA |
| 10. The least productive areas of forest should be restored to a pre-forest condition where there is a conservation gain. | **Medium** | Increased £1.0 million year, DARD PE | Joint Forest Service and EHS. | Report through FS Annual Report. | TBA |
| 11. The quality of the forest environment should be improved to support the biodiversity strategy and other initiatives within the constraints of timber production and public finance. | **High** | Increased £ 0.2 annually million PE spread between public forests and private forests | Joint Forest Service and EHS. | Report through FS Annual Report. | TBA |

| Recommendations - Access | Priority | Financing | Management | Monitoring | Evaluation |
|---|---|---|---|---|---|
| 12. Responsibility for policy on public access to forests should transfer from DARD to DoE. The Forest Service should continue to deliver forest recreation services on DARD land as a service provided to DoE and District Councils. | **Medium** | Transfers of PE but little or no net cost except as a result of policy decisions by DoE or Councils. These bodies to incur the costs of improvements, and meet running and administrative costs of hard charging. Commercially viable activities to be franchised out (e.g. caravan sites). | By SLA or contract. | By SLA or contract review. | TBA |
| 13. The balance of expenditure on facilities for forest access should be improved by better monitoring of use and by closing excess facilities. | **High** | Forest Service and EHS PE to implement survey and monitoring. FS PE to decommission redundant facilities. | Joint Forest Service and EHS in consultation with District Councils. | Report through FS Annual Report. | TBA |

| Recommendations - Forest Expansion | Priority | Financing | Management | Monitoring | Evaluation |
|---|---|---|---|---|---|
| 14. Forest expansion should continue at existing rates because of the strong support for tree planting as a measure to improve the environment and to provide access opportunities for urban populations. This recommendation should be reviewed if the opportunity cost of land changes significantly. | **High**<br>Private sector expansion is the most suitable vehicle for agro-forestry, fuel wood and general environmental planting because significant expansion may be obtained for payments approximating to agricultural income forgone. Public sector expansion is the most suitable vehicle for timber production objectives because of the need for very efficient working and economy of scale, and may be the only vehicle to secure public access unless there are special circumstances, for example to reduce trespass on industrial sites. | Current PE provision, increasing by 50% (£1 million) over 5 years to meet the accumulating commitments of annual compensating payments to landowners. Forest expansion is likely to result in lower public expenditure on agriculture spread over many years. In 1995(?) this was calculated as equivalent to 75%, 60% and 65% of the market price of agricultural land in the SDA, DA and lowland areas of NI respectively.<br>Financial cost likely to be less than the full economic cost if landowners plant their own land. | Forest Service business plan and successive programmes for European Funding. | Report through FS Annual Report. | TBA |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15. | Where tree planting takes place it should also offer an opportunity to add value, for example through fuel or timber production, or complement existing farming activity. | **High** | Up to 50% increase (£1.0 million) on current levels of public expenditure to target expansion at specific objectives, except for access. Each 100 ha acquired for public access will cost about £2 million and should therefore be the subject of a specific business plan. | FS to consult with EHS and Planning Service on locations to target for forest expansion. Land acquisition should be the responsibility of District Councils, and advised/ supported by Forest Service on practical aspects of tree growing. | Report through FS Annual Report. | TBA |