

Managing our forests for the future

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Summary

The pressures experienced by forest managers today reflect a growing public interest in the environment and in forestry. There is an increasing awareness that inappropriate management could reduce the potential of ecosystems to supply the goods and services which society may demand in the future. This concern for the future finds its expression in the world-wide movement towards sustainability. Sustainable management has been practised in forestry for centuries. Although subjected to various interpretations, it has usually been seen in this part of the world as sustained yield in a wood supply-oriented context. Modern ideas of sustainability embrace all the goods and services of the forest and suggest that 'sustained yield' should be replaced by the broader concept of 'sustainable forest management'.

The commitment to sustainable forest management in Europe has been developed in the Helsinki Process, one of several major international forums currently addressing the issue of sustainability in forestry. The Helsinki Process was established in 1990, and its membership encompasses most European countries, including Ireland. It has developed criteria of sustainable forest management and for each criterion, a series of indicators against which progress can be measured over time.

Both the concept and definitions of sustainable forest management are unsatisfactory in several respects. They tend to ignore the fact that soil, climate and even the ecosystems we are asked to manage on a sustainable basis are all dynamic and that the natural tendency in soil development within temperate regions is towards acidification. Definitions also tend not to be explicit on whether sustainable development should be pursued for the benefit of future generations or for the sake of the forest itself. This uncertainty suggests that the value systems defining the concept are to a large extent derived from the views of society, rather than from forest or ecological science.

We need to be very clear that forestry is an economic activity. Plantation forests are not natural - they are artificial ecosystems established for the purpose of supplying timber, but with the potential to deliver a range of goods and services to society. Nor were the ecosystems they replaced natural. The Irish landscape is the product of many centuries of human interference and, in the case of the uplands, has been significantly degraded as a result of this disturbance.

Nevertheless, as foresters, we have a responsibility to show a clear commitment to the concept of sustainability. Most of our forests were established long before sustainability, in the context in which it is now being used, became an issue. Our management systems were developed to meet the primary objective of timber production. It stretches credibility to think they could all easily fit into the broader template of sustainable management. Questions relating to resource depletion, biodiversity and impacts on other ecosystems all have to be examined in the context of our forests, particularly those on thin, poorly buffered acid soils.

We need to face these questions honestly in open debate. We need to support foresters by making available opportunities for further education on the principles and techniques of ecosystem management. Our investment in research has not been adequate and if we have a real commitment to the forests of the future, we must show a greater level of commitment to research now.

We should openly discuss the issue of sustainability and participate actively in public debate. Our survival as professionals may depend upon it. Ultimately, if we fail to produce the sort of forests society requires, we will be subject to ever-increasing controls by society. In other words, our ability to function as professionals will be taken from us. We owe it to our profession and to forestry to demonstrate that in managing our forests we can accommodate the primary goal of timber production with society's changing views on the role of the forest.

Ecosystem management

The management of forests requires of its practitioners a long term view and a considerable act of faith in the future. The forester, in the latter years of his career at least, can say, These trees will be here long after I am gone, there will be a market for them and people will be grateful for what I did at their establishment. The hallmark of the professional forester is his commitment to sustained yield. This is the basis upon which our forests have been managed throughout this century. Through all that time, the primary management objective – the production of wood – has also remained unchanged. It is therefore fair to say that foresters must be conservative in their professional outlook. They cannot allow themselves to become the prisoner of every changing fad and fashion, but must keep their sights firmly set on the goal of timber production.

Now, in this industry characterised by gradual evolution rather than rapid transformation, all is changed. Afforestation is at record levels, and control of the bulk of the forest estate has passed from a government department to a commercially motivated company. The private sector is also growing at an unprecedented rate and is having a significant influence on site type and choice of species. On top of all this, forestry is no longer just the business of foresters. Everyone, including fishery managers, landscape architects, tourism officials, conservationists, ecologists, journalists and worst of all, some might say, the dreaded environmentalists, all want to have their say about forestry. Forests established for one objective only – timber production – are now being criticised because they do not meet other objectives – amenity, water quality, habitat conservation – for which they were never designed. Little wonder then that the forester, used to working within a well defined framework, finds himself confused and disturbed. The goalposts have been moved, and the forest manager is being asked to don the garb of an ecosystem manager – a hat which doesn't always fit so well.

Similar pressures are being felt by foresters all over the world. Yet, I wonder has the forester's role changed so much? In Central Europe, the forester has always been a wildlife manager - he knows the habits of the forest animals and he feeds the deer through the harsh winter. In Slovenia, I remember on our Final Year university study tour meeting foresters whose primary role was not the production of timber, but the management of streams. The protection forests within their charge, located high in the Julian Alps, are vital for the conservation of the soil resource and the prevention of flooding in the valleys far below.

The difficulty for foresters in dealing with these pressures was illustrated for me by an incident in Sweden, in 1978, when some forest companies planned to use herbicides to control birch in the coniferous forests of the north. Swedish forests are open to every citizen to ramble, camp, and most importantly, to pick berries. It was therefore hardly surprising that *skogsbesprutning* – the spraying of the forests – became a national issue

with a well-organised protest campaign. The forest companies, anxious to establish their right to manage the forests as they saw fit, went ahead with their plan and, with all the subtlety at their command, sprayed the forest and the protesters with 2-4-D.

Sustainability

It is important to analyse what is happening to forestry today. Political action represents, however imperfectly, the will of a proportion, not necessarily a majority, of the population. People today are more interested in the environment than ever before. They have feelings about what sort of activity is appropriate in the countryside, and they are worried about possible damage to natural resources. Controls on forestry, environmental impact assessments, Forest Service guidelines and the requirement for fishery board approval for afforestation projects, all represent the political response to their expression of concern. Forest managers are constrained by this new legislation. They feel it is unnecessary and misdirected, and are frustrated at being able to do so little to control it. The environmentally-aware public, on the other hand, is reassured. Government is responding to their concerns and taking care of the problem.

When people express concern about water quality, monoculture or a loss of biodiversity, they are demanding the wise management of the ecosystem. Although they may not always realise it, they are espousing the cause of sustainability.

Sustainability is a fundamental goal of ecosystem management. At the heart of the concept is an awareness that the planet's resources are not inexhaustible. They must be used responsibly and in the best interests, not only of this generation, but of those who will follow us.

The history of sustainable forest management is a long and indeed, a proud one, dating back to the latter half of the 17th century. The idea of sustainability arose from a responsibility to ensure that the utilisation of the forest resource by the present generation should be such as to allow future generations to benefit from it to the same extent (Wiersum, 1995). Since its inception, its interpretation has gradually become more inclusive. In the United States, a social dimension of sustainability was recognised over 60 years ago. Sustainability was interpreted as community stability, i.e. management of the forest so as to ensure that forest-dependent communities and industries would be sustainable. In Ireland, we have espoused the principle of sustainable management, but as we have a rapidly expanding forest estate and are still a long way from attaining a normal forest with equivalent areas at each age class, we have not had to explore the concept to any depth. In essence, we see the implementation of the sustained yield principle as management designed to balance output with growth and to ensure an even supply of material to the market. Underlying this interpretation is the idea that the productive capacity of the site must be protected and maintained. This is a relatively narrow, supply-oriented interpretation of the sustained yield concept. Modern ideas of sustainability embrace all the goods and services of the forest and suggest that 'sustained yield' should be replaced by the broader concept of 'sustainable forest management' (Wiersum, 1995). As the view of the forest and its functions has developed, so too has thinking on sustainability. It would be foolish indeed to imagine that the last word has been spoken or to predict with confidence how future generations will interpret the concept.

The commitment to sustainable forest management in Europe has been developed in the Helsinki Process¹, one of several major international forums currently addressing the issue of sustainability in forestry. The Helsinki Process was established in 1990, and its membership encompasses most European countries, including Ireland. It has developed criteria of sustainable forest management and for each criterion, a series of indicators against which progress can be measured over time.

Sustainable management of forests has been defined under the Helsinki Process as “the stewardship and use of forests and forest lands in a way and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems.”

The six criteria of sustainable forest management set down by the Helsinki Process are as follows.

1. Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.
2. Maintenance of forest ecosystem health and vitality.
3. Maintenance and encouragement of productive functions of forests (wood and non-wood).
4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.
5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).
6. Maintenance of other socio-economic functions and conditions.

These criteria are conceived so as to make them all applicable both locally (at the management unit) and at higher planning levels, especially at the national level (Lanly, 1995). Indicators are intended to be assessed as trends. Monitoring indicators over time will allow an assessment of progress towards sustainability of forest management at national level (Anon., 1995a). FAO has taken on the task of harmonising the various initiatives on sustainable forest management and has brought together representatives of countries involved in the various international initiatives.

There is a good deal of concern that criteria identified by international consensus are not necessarily appropriate, nor the related indicators readily applicable, at national level (Lanly, 1995). Indeed, it may be unrealistic to try to develop a single, internationally acceptable definition of sustainability. It would be more appropriate to establish domestic criteria and indicators, recognising that our understanding of sustainability will evolve over time.

This view highlights one of the most immediate difficulties with the sustainability debate, namely the definition of the term. Many interpretations of sustainable management

¹ Ministerial Conference on the Protection of Forests in Europe, held in Helsinki, 16-17th June, 1993. Information presented here is from the General Declaration and the Helsinki Resolutions issued following this conference, and from the criteria and indicators for sustainable forest management adopted by the First Expert Follow-Up Meeting of the Helsinki Conference, held in Geneva, 24th June, 1994.

have been suggested, but I select the above definition because Ireland is a contributor to the Helsinki Process and, while no nation is bound by the outcome of the Process, it may be assumed that we have some degree of commitment to it.

I find both the concept and definition of sustainable forest management unsatisfactory in several respects. There is no time scale. We are asked to assume that the planet is indefinitely sustainable. The basic resources for forest growth are climate and soil. The natural tendency in soil development in temperate regions is towards acidification and impoverishment (Ball, 1975). The mountains are being washed to the sea. No matter what we do, we can only slow down the process, not stop it.

The definition of sustainable forest management fails to make clear why we should manage forests sustainably. The sustained yield concept embodied the idea of forest management for people, whether by regulating the supply of goods and perhaps services from the forest or by concentrating on the sustainability of communities. Definitions of sustainable forest management tend not to be explicit on whether sustainability is for people or for the forest itself. In 1992, the Society of American Foresters added a new canon to their Code of Ethics, reflecting professional commitment to a "land ethic". Interpretation of its meaning are diverse, with disagreement as to whether it represents an ethic of the land that is people-centred or for the land itself (Craig, 1992; Proctor, 1996). The latter idea is related to the concept of the inherent right of nature to exist. The fact that such a view commands support suggests that the value systems that define the concept of sustainable forest management are to a large extent derived from the views of society, rather than from forest or ecological science (Wiersum, 1995).

This conflict was well expressed in an editorial in *Unasylva* a few years ago (Anon., 1992). The point was made that many of the definitions of sustainable development suggest that the objective is "to 'maintain' the resource base as an end in itself and not as a means to the ultimate goal of improving, on a sustainable basis, the living standard of humankind. This is an important distinction because, almost without exception, economic development requires using up energy and raw materials and, in turn, creating waste which the planet must absorb. That is to say 'green growth', at least on a universal level, is not possible. Sustainable development necessarily involves change and a series of trade-offs and compromises."

We need to be very clear and forthright on this point. Forestry is an economic activity. Plantation forests are not natural. They are artificial ecosystems established for the purpose of supplying timber, but with the potential to deliver a range of goods and services to society. They are of course part of the environment, but they are not part of 'nature'. In most cases, nor were the ecosystems they replaced natural. The Irish landscape is the product of many centuries of human interference and, in the case of the uplands, it has been significantly degraded as a result of this disturbance.

All crop production accelerates the process of soil acidification. While the acidifying effect of agricultural crops can be corrected by lime application, supplies of limestone, although large, are not infinite and are being used at an unsustainable rate. In current forest practices, liming is uncommon and, based on experience to date, tends to induce rather than reduce negative impacts.

Coniferous forests are vulnerable to resource depletion because they occur largely on thin acid soils which are poorly buffered and therefore ill-equipped to counteract the

effects of losses of organic matter and nutrients in the harvest and the influence of acidifying processes. Peatland forests present a special problem in the long term, because the soil material is biodegradable. The development of peatlands for forestry begins a process of peat subsidence and oxidation. Whether or not decomposition will continue indefinitely will depend, *inter alia*, on peat type and management regime. While the wasting of the peat resource is of concern in itself from several perspectives (for example, its contribution to the global carbon balance), the impact it will have on the sustainability of the forest will be influenced by factors such as the character of the sub-peat mineral soil and the hydrology of the area.

There is another important question that must be asked at the risk of being accused of lacking a commitment to future generations. Is sustainability always the correct option to follow? I suggest that long term sustainable management of forests may not be possible on certain poor site types. I have no evidence for this, as the necessary information is not yet available. However, even if it were true, I believe that a case could be made for plantation forestry in some such situations. As I have previously explained, the ecosystem replaced by the establishment of the plantation, take heathland as an example, is itself disturbed, grazed and very likely, non-sustainable. A plantation forest, managed for several rotations to achieve both increased production and a greater level of sustainability, may well be a better option for society than the maintenance of an unsatisfactory *status quo*.

It is difficult to think in the time frame implied in the sustainability concept. Little account is taken of the dynamic nature of the environment, a factor which increases in importance as the time scale extends. Given the current debate on climate change, this seems a curious inadequacy of the criteria. Management systems and technological development are also constantly changing, and it is quite possible that new techniques will be developed which will allow the inexpensive enrichment of the soil, for instance, from renewable sources. Who knows? After all, it is only 100 years since the Frank-Caro process and a few years later, the much more successful Haber-Bosch process, were developed to extract nitrogen from the atmosphere and convert it into a form which could be applied as a fertiliser and taken up by plants.

Today, we recognise that two of the major pressures on the sustainability of crop production in the future are acidification of the environment and climate change. In this case, acidification refers particularly to the impact of pollution, which accelerates the natural rate of acidification in the soil. Fifty years ago, who would have considered either of these factors as potential threats to sustainability? We must recognise that these pressures may decline in importance in the future, but equally that others, as yet unknown, may emerge.

The deficiencies in the Helsinki Process, and there are many, give credence to the feeling that this is a political process in which the views of scientists are of secondary importance to the assertion of governments that they are committed to a rather nebulous idea of sustainability. Despite this, sustainability is a noble aspiration and we should examine our forests and our management practices to see how well they conform to the ideal.

The really big problems for sustainable management of forests are in regions where exploitation, rather than sustained yield forestry, is practised. Practices of overcutting are clearly unsustainable and their correction presents enormous problems of a social and economic nature. In such regions, the preservation of biodiversity is also often a major issue.

By comparison, the problems for plantation forestry are less severe, although they have been the subject of considerable debate in some parts of the world, such as New Zealand (Biggsby, 1994; Hughes, 1994; Perley, 1994; O'Loughlin, 1995).

Many of our forests are still in their first rotation. They consist entirely of introduced species and they are growing on sites never previously afforested. These man-made ecosystems are not closed like crops in a glasshouse. They interact with the environment around them. They receive inputs from the atmosphere and they may export nutrient or toxic ions to surface waters. They modify streamflow, influencing both hydraulic discharge and flow patterns. Under these circumstances, it is inevitable that they raise questions regarding their long term sustainability. Most of our forests were established long before sustainability, in the context it is now being used, became an issue. Our management systems were developed to meet the primary objective of timber production. It stretches credibility to think they could all easily fit into the broader template of sustainable management.

The world-wide loss of biological diversity, which is seen as a serious threat to development, was highlighted at the 1992 Earth Summit. The conservation of biodiversity at population, species and gene level has become a primary objective of the journey towards sustainability. Biodiversity is certainly an appropriate consideration in the context of natural forests or managed forests derived from natural stands. It is more difficult to see how it should be applied to plantation forests such as ours. It is often assumed that biodiversity is a prerequisite for sustainability. This leads to a further assumption that monoculture is incompatible with biodiversity and therefore, with sustainable forest management. There is little scientific evidence to support either of these contentions. There are indications that complexity, of which diversity is an aspect, within ecosystems contributes to sustainability, by increasing both the stability (resistance to impoverishment) and the resilience (ability to recover from damage) of an ecosystem. However, the information which would indicate the relevance of this to our plantation forests is lacking. Of course plantation forests alter the ecosystem, change vegetation and modify the habitat for fauna, leading in many cases to changes in species occurrence and numbers. Whether or not this will actually influence biodiversity is another issue, which is probably site-specific. It is all too easy to judge from the absence of vegetation on the forest floor of a thicket stage plantation that crop establishment has resulted in a reduction in biodiversity. This assessment takes no account of the fauna and microflora of plantation forest ecosystems, which may actually be enhanced by the forest's presence. The issue of biodiversity is important on a regional basis. For example, if the Slieve Blooms were totally covered in forest, would the existing species of plants and animals die out or be reduced in population to the extent that they were no longer viable? If so, the biodiversity of the region would be threatened. However, a mix of properly monitored land uses will not represent a threat to any of the existing species. As far as I am aware, there is no research in progress in Ireland on this important issue. We need to look both at how we can increase biodiversity within our plantations and what effects might follow for the sustainability of the ecosystem, the protection of other ecosystems or the enrichment of rural landscapes. Potentially valuable research topics include the management of plantation margins, the effects of introducing a proportion of broadleaf species into conifer plantations, the potential contribution of dead wood in the forest and the effects of varying the size and shape of clearfells.

Artificial ecosystems require management intervention to keep them in existence. It is easy to forget that without management, something as simple as grassland would, over most of Ireland, revert to broadleaf scrub within 30 years, and ultimately, to deciduous woodland. Management is therefore essential to the sustainability of man-made ecosystems, whether they be forest plantations or cereal crops. Management practices can of course have negative implications for sustainability, if they induce soil damage or water pollution.

Commitment to the future

To ask, Are you in favour of sustainability? is rather like asking, Do you support motherhood? We are all the beneficiaries of it and the generations which will follow ours depend upon it. That said, there is no doubt that it is still a fairly crude notion. It requires considerable refinement before it can realistically embrace the inevitable conflict between the utilisation of natural resources and the perpetuation of their productive potential *ad infinitum*.

The concept of ecosystem management is also very attractive. It has a seductive appeal and, as with all seduction, the seduced may be led on, heedless of the pitfalls on his path. The recent *Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management* (Anon., 1995b) highlights the difficulties of practising ecosystem management. The difficulties are many and are to a large extent derived from the paucity of existing data on ecosystems and the limits in the current understanding of ecosystem processes. Indeed, the problems surrounding the implementation of the concept of sustainable forest management have recently resulted in the beginning of what may be a retreat to a softer commitment towards 'well-managed forests' and 'forest quality' (Wright, 1995).

The criteria and indicators of the Helsinki Process are in several respects based on poor scientific reasoning. The conditions prevailing in a country with an expanding forest estate established on land previously forested and subsequently degraded as a result of the clearance of that forest, are hardly considered at all. Foresters need to make a much stronger contribution to the further development of the Process. While I recognise that it may be difficult to influence the Process significantly at this stage, we certainly should make an effort to do so.

While addressing the Helsinki process with greater vigour than we have up to now, we should examine the practicalities of applying the principles of sustainable forest management in Ireland. This can best be done by first developing a series of best management practices or guidelines for the forest manager in the application of the principles of sustainable forest management. We should consider all aspects of sustainability and examine approaches such as resource accounting (Xu *et al.*, 1995) as possible tools for integrating the economic and ecological aspects of forest management. We should support research which will deepen our understanding of ecosystem processes and improve our knowledge of the interaction between forest management practices and the environment. The level of research funding on the interaction of forestry and the environment in Ireland is very low. The failure of the private forestry sector and the processing industry to support it significantly does no credit to either group and will, in all likelihood, be to their financial detriment in the longer term. Existing research is inadequately funded and tends to be of

the trouble-shooting variety, reacting to current or impending problems. To address sustainability issues effectively, a stronger research base will be required, affording the opportunity to study ecosystem processes at a more basic level. If we have a real commitment to the forests of the future, we must show a greater level of commitment to research now.

As foresters, we have a responsibility to show a clear commitment to the concept of sustainability. We should openly discuss the issue and participate actively in public debate. Our survival as professionals may depend upon it. Two quotes from the *Journal of Forestry*, where these issues have been vigorously debated over the past few years, express this sentiment clearly.

... it is the public that grants any profession its authority to practice so that that profession may satisfy a societal goal or need. If the public perceives that the profession no longer addresses societal goals, the authority is simply placed elsewhere.

(Banzhaf, 1993)

... if forestry is not to be accused of paying lip-service to a fashionable buzz-word, we must continue the process of defining forest stewardship through actions that demonstrate a commitment to our highest aspirations.

(Coufal and Cornett, 1992)

Associated with the concept of sustainable forest management and good forest stewardship is the idea of 'green certification' initiated by the Forest Stewardship Council. Indicators are being identified at forest level which can be used for the certification of wood as the product of a sustainably managed forest (Lanly, 1995). Already, there is a commitment from one of the largest DIY chains in the United Kingdom to buy wood only from well managed forests (Wright, 1995). Countries which had established their credentials for sustainable forest management would be entitled to declare this, thereby giving them a competitive advantage in the sale of their forest products. This may appear to be an important step towards sustainable forest management. It also presents a marketing opportunity, of which we could probably avail. However, I believe that it would be a serious error to adopt such a system of certification, as it would undoubtedly hinder rather than assist progress towards sustainability. Let us suppose such a system were in place. Pity the poor scientist who uncovers any evidence suggesting unsustainable forest management in Ireland. I fear the temptation to shoot the messenger might become overwhelming. Unfortunately, to oppose the introduction of such a system will be interpreted as supporting a *laissez faire* attitude to forestry, but if the sustainability concept is to have any real value, it must be discussed openly and honestly. We owe that much to our children.

To emphasise that the debate on the sustainable management of forests is far from over, let me conclude with two further quotations. The first is from Jacob Bronowski who, during his career as a scientist, travelled the difficult journey from physics to biology and found that the road led on to philosophy. In his book, *The Ascent of Man*, he writes:

There is no absolute knowledge. And those who claim it, whether they are scientists or dogmatists, open the door to tragedy. All information is imperfect. We have to treat it with humility. That is the human condition.

(Bronowski, 1973)

The second quotation carries a similar message, although it was written over 2,000 years ago. Socrates, describing a politician he met, said:

I formed the impression that although in many people's opinion, and especially in his own, he appeared to be wise, in fact he was not. I reflected as I walked away, 'Well, I am certainly wiser than this man. It is only too likely that neither of us has any knowledge to boast of; but he thinks that he knows something which he does not know, whereas I am quite conscious of my ignorance. At any rate it seems that I am wiser than he is to this small extent, that I do not think I know what I do not know.'

(Plato, Apology)

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