

The Sustainable Forest

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The road to Rio

The word 'sustainable', uttered at the political level as sustainable development and at the forest level as sustainable management, has rapidly become commonplace. Unlike its cousin 'biodiversity', sustainable seems to be easily understood and accepted. Unfortunately, upon analysis biodiversity is probably the concept most open to scientific definition and measurement. By comparison sustainability is an ideal that is characterised by a range of subjective interpretations. There might even be the fear that apparent agreement between parties, for example forest managers and conservationists, is illusory because the various sides differ significantly in their interpretation of 'sustainable'.

The concepts of sustainable development first came to prominence with the Brundtland report, which called for national development policies that would not advantage the present generation at the expense of future generations. The concept was given a sharper focus in the Rio Declaration on Environment and Development of 1992 which stated, among others, the following three principles:

Principle 1. Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature;

Principle 2. The right to development must be fulfilled so as to equitably meet developmental and environmen-

tal needs of present and future generations;

Principle 3. In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

These rather lofty aims were then backed by a thoroughly practical call in Principle 17 that 'Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant and adverse impact on the environment and are subject to a decision of a competent national authority'.

In signing the Rio Declaration states have effectively entrenched these ideas into their own national policies.

It will be recalled that that section of the Rio process regarding 'sustainable development of all types of forests' was eventually accepted only as a 'non-legally binding authoritative statement of principles'. Nevertheless, it carries considerable moral authority. These principles include the following on sustainability.

Principle 2(b). Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. These needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity,

carbon sinks and reservoirs, and for other products. Appropriate measures should be taken to protect forests against harmful effects of pollution, including air-borne pollution, fires, pests and diseases in order to maintain their full multiple value.

Protection of forests in Europe – the Helsinki Process

Although the forestry principles enunciated at Rio are non-legally binding, the countries of Europe were more ready to accept essentially the same ideas when they attached signatures to the declaration of the Ministerial Conference on the Protection of Forests in Europe held in June 1993. In this the participants agreed that sustainable management 'means 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'.

To this end guidelines were adopted that state, *inter alia*, that 'human actions must be avoided which lead, directly or indirectly, to irreversible degradation of forest soils and sites, the flora and fauna they support and the services they provide... Forest management should be based on periodically updated plans or programmes at local, regional or national levels, as well as for ownership units... Multiple-use forestry should be promoted to achieve an appropriate balance between the various needs of society... Afforestation should be conducted in a manner that does not negatively affect ecologically interesting or noteworthy sites... Native species and local provenances

should be preferred where appropriate'.

Sustainable development

Thus, not surprisingly, sustainability encompasses more than sustained yield and stewardship. Not that sustained yield is rejected in this concept of sustainability, rather it becomes only one of the components. However, changing transport infrastructures in the twentieth century mean that there is little need to achieve sustained yield on a forest basis, rather on some greater area such as conservancy, region or even nation. Scale is clearly an important consideration.

The definition of sustainable in the Rio Declaration emphasises that human beings are central, whether of the current generation or in the future. In their discussion of forestry in relation to sustainable development the UN Food and Agriculture Organisation pointed out that such definitions of sustainable development implies acceptance of loss of forest provided that net human happiness, now and in the future, is improved. They state 'if sustainable forest management means an attempt to freeze the world as it is, it is clearly impossible... The aim must be to ensure that wood and other forest products are harvested sustainably, that forests are cleared only in a planned and controlled way and that the subsequent land uses are productive and sustainable'. Any other definition for countries where population growth and land hunger are major issues would mean the institutionalisation of starvation, which clearly must be rejected on humanitarian grounds.

Happily the political choices are not so stark in the countries of western Europe.

Sustainable management of the forests of Europe

The Rio and Helsinki declarations are now accepted parts, indeed legal parts, of the forest policies of the countries of Europe. An essential component of this policy development is management for multiple-use, including economic and social functions. Also the ecological and conservation aspects are to be emphasised, conservation including those factors responsible for the productivity of the site. The Helsinki definition of sustainability starts with a call to maintain biodiversity. Fortunately, the problem of what is meant by biodiversity (which if too closely defined could prevent us all getting out of bed in the morning) is being tackled in various ways by such activities as the Malaysia-Canada initiative, the Montreal Process and, of most relevance to Europe, the Helsinki Process. The latter is seeking to develop agreed criteria and 'most suitable quantitative indicators' for sustainable forest management. Such indicators as are being talked about (e.g. total volume of growing stock, changes in carbon storage, annual area burnt etc.) are to be perceived on a national scale, for scale remains a worry in this development. Clearly if biodiversity is to be assessed on scales down to a hectare interpretation in relation to an even-aged forest (plantation) becomes difficult because each stand as it ages passes through a sequence of stages of differing ecological characteristics and hence biodiversity. However, on a landscape or greater scale a shifting mosaic of age classes might realistically meet all requirements. Scale is important in any such definition, as it is when considering the realisation of multiple-use objectives.

Aside from biodiversity the Helsinki

definition of sustainability requires the maintaining of productivity and regeneration capacity of the site, preserving the vitality of the forest, avoiding damage to other ecosystems, and fulfilling relevant economic and social functions. Perhaps this can be reduced to soil, plant health, water and people.

Soil

Management cannot effect directly received sunlight or rainfall. Its main impact on the factors of production, therefore, work through the soil. Under natural conditions fertility normally increases under trees. Careless or inappropriate management can significantly reverse this process.

Inevitably the harvesting of produce from a site leads to an export of nutrients in that harvested product, whether it be a sheep carcass, grain and straw or timber. In comparison to all but the most extensive agricultural systems conventional forestry leads to little loss of nutrients. Various factors, however, can significantly change this. Most obvious is any trend towards whole-tree harvesting with its removal not only of timber but also of the more nutrient rich branches and one to four age cohorts of foliage. This problem is easily understood where these nutrient rich components are removed from the site. Similar problems, however, may result for part of the site if harvesting leads to major concentrations of brash, for example to provide the mat over which harvesters and forwarders will move or to provide bared land to ease replanting. Already fertility problems have been identified in Australasia as a consequence of wind blowing and burning. However, perhaps too much should not be made of this factor because it is only on the most infertile of sites that nutrient loss associated with brash removal

will result in anything other than a very transient reduction in the growth of the succeeding crop.

Of far greater concern is any action that leads to increased erosion. Erosion is a natural process that over geological time-spans ensures that impoverished surface soil is removed to expose the more nutrient rich horizons beneath. However, it is all too easy for management action to lead to accelerated soil loss, both of still fertile surface soil and sometimes of entire soil profiles. The steps to ensure that this does not happen are well known and are enshrined in best practice instructions around the world. All too frequently erosion is still the consequence of forest operations and for this there can be no excuse.

Perhaps less readily appreciated is the soil damage that can result from compaction, damage that is not easily rectified on a human time-scale. The risk is predominantly associated with harvesting operations and the necessary avoidance measures are generally well defined. Any harvesting operation should be preceded by rigorous risk assessment, should only involve well trained and responsible personnel and should be effectively supervised and monitored. It would be idle to pretend that this is always the case. Indeed, in some parts of the world damaging harvesting techniques continue to be the standard and excite little adverse professional comment. In many instances there is a need for new machinery that is less likely to compact, cut up or puddle the soil and fortunately machinery designers appear to be striving to provide these. In other situations it may be appropriate to consider reverting to modern versions of old means of extraction, such as horse, oxen, elephant or timber shute, that can be made economically viable while retaining their

environmentally friendly characteristics. Such decisions have to be based on rational analysis rather than emotion. It must be emphasised that the internal combustion engine will remain the main motive force for timber extraction, the challenge is to minimise the environmental impacts of the machines in which it is installed.

Plant health

This is an aspect of sustainability that seems to be attracting little comment and yet it is central, particularly to those of us who live on islands from which some diseases can still be excluded. The loss of elm from the temperate forests of the northern hemisphere, and the loss of chestnut from the American variant of this, as a result of imported diseases must be regarded as severe blows to biodiversity and sustainability. The forests of Britain and Ireland are free from the bark beetle *Ips typographus* and should this arrive from our continental neighbours change would be inevitable. There has to be particular risk to the valuable remnants of Scotland's native pinewoods. Continuance and enforcement of effective quarantine measures must be the single most important step that can be taken at national level to ensure sustainability. It follows that effective monitoring and control of indigenous diseases are also important.

The Helsinki Declaration included in this category protection from fire and pollution. Fire is a difficult question because it is a natural feature of our forests and intimately involved in forest succession and the nature of many of Europe's forests from the boreal to the Mediterranean regions. Indeed the Swedes have decided, on the basis of ecological and biodiversity arguments, to make greater use of fire in their forest

management. However, over much of Europe, and particularly in Mediterranean regions, fire frequencies are now artificially high leading to destruction of vegetation and, frequently, loss of soil through erosion. Biodiversity, therefore, entails the control of fire, not its elimination.

Pollution can and has damaged forests. The scare over acid rain notwithstanding, pollution probably did more damage to Europe's forests through the last part of the nineteenth century and the first part of the twentieth century than is the case today. However, in specific localities pollution is still a real threat, usually air pollution from local sources, and we are coming to realise our legacy of soil pollution in specific areas with industrial concentrations. Solution of these problems, if only to make the situation no worse, lies in the hands of governments rather than forestry departments and forest managers.

Water

The Helsinki Declaration calls for sustainable forest management that does not adversely affect neighbouring ecosystems. The main route for such adverse impacts is the stream and river water leaving the forest. This should leave the forest at least as pure as that reaching the forest, indeed in comparison to rainfall it should be purer. Contamination can take the form of pollution and chemicals, including oil, resulting from forest management operations, notably harvesting. With care, including pre-operation risk assessment and effective supervision of operations, such damage can be minimised, even eliminated. Other risks are associated with drainage and road building. The current Irish and British guidelines probably cover most

eventualities but further refinement might be needed, for example by developing design criteria specific to different soil types.

The vexed question of pollution-derived acidity remains, for in this case the forest is essentially being asked to remove from rainwater pollution derived from remote industrial operations. The efficiency with which this can be done will vary with soil type but the manager does have some control as outlined in the water guidelines. However, the international agreements are quite clear in placing the responsibility with national governments to tackle this problem at source, that is to control the industries that create the problem.

People

Forests interact with people on many scales and in many diverse ways. When talking about Europe's forests mention can be made of wealth creation, particularly locally, of recreation, of the conservation or creation of landscapes, of the conservation of flora and fauna (including that which is hunted), and of the provision of non-timber products such as berries, fungi etc. This effectively returns the debate to the commitment from both Rio and Helsinki for multiple-use management.

Multiple-use management is an important national ideal but its impact is essentially local. The concept embraces the idea that the people who live in and adjacent to the forest are those who interact most with it and who are therefore significant stakeholders who can reasonably expect to be consulted. It is all too easy to imply that calls for local involvement in forest management apply to the less developed world and have little or no implications for the forests of western Europe. This would be to profoundly misunderstand

the thrust of politics, both international and national. People expect to be consulted, and to be consulted sufficiently frequently for changing social aspirations to be reflected in forest management. The fact that society's aspirations are changing faster than our forests mature is a difficulty but should not allow avoidance of regular consultation and consequent adjustment of objectives. Consultation should occur at the national level in relation to forest policy and at the local level in relation to the realisation of objectives of management. Such consultation should be a continual process to ensure this at national and local level and should be enshrined in forest policy and legislation.

Inadequate consultation, and a reluctance on behalf of the forestry profession to respond to the change around it, has been at the base of many of the conflicts that seem to have characterised forestry in the four decades 1950 to 1990. Such conflicts should have been resolved through consultation and a willingness to respond to changing circumstances. In this context it should be emphasised that it is not the function of the professional forester either to write forest policies or to set the objectives of management for specific forests. Whilst the forester should inform this process, management objectives and policy aims should be established by the owners and the electorate.

Thus, the way forward chartered by Rio and Helsinki involves consultation in the search for sustainability. Quite how such consultation be carried out, ensuring that everyone from local housewives to national NGOs have their say, and that the views of no one group dominate over another, remains a challenge for which as yet few answers appear to be offered.

Concluding remarks

The concept of sustainability as currently being advocated embraces a wide range of ideas and aspirations, some of which seem to be only tenuously linked to a single definition of sustainable. It may be said to embrace the three goals of maintenance of biodiversity, multiple use and responsibility to the future. The more it is discussed the clearer ideas become and this process of developing and focusing of the ideas is essential if future conflict is to be avoided. There is still a very real risk that forestry policy formulation may be bedevilled by the fact that the various stakeholders are choosing their own meanings to ill-defined words (sustainable, multipurpose, local etc.) and so simply avoiding effective communication and hence stoking the fire of future conflict.

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