

Down Hill All the Way? What future for the uplands?

Areas such as the British uplands are characterised by intense ecological degradation, economic decline and social disintegration. But there are sustainable alternatives.

The British uplands provide a microcosm of the global crisis of sustainability, albeit one with many distinctive features. Although there have been individuals who attacked the way the uplands were suffering from long-term degradation, for example Sir Frank Darling in the 1940s, official recognition in Britain that there was a problem there only came much later. A series of subsequent studies spotlighted a variety of issues surrounding the environmental impact of changes particularly in upland farming, forestry, game management, and tourism. They also noted a decline in the social and economic position of upland rural communities. These included general reviews by the Countryside Commission and the Council for National Parks as well as studies of specific areas such as Exmoor (*The Porchester Report*), the Hartsop Valley in the Lake District, and the Peak District.

The major uses in the uplands are two monocultures. One is in essence a livestock monoculture, dominated by sheep grazing. The other is plantation forestry, dominated by fast-growing conifers, often Sitka spruce. In both cases, the land use has been characterised by more throughput, either as a goal in its own right or as a means to other ends (for example, headage payments to provide support for economically marginal farmers or grants and technical advice to create a strategic reserve of timber).

It is widely accepted that, down the centuries, climatic change has had a significant impact upon the flora and fauna of the uplands. Since past climatic change is a 'fact of life' which humans cannot alter, the following discussion will be only about anthropogenic changes which seem to have both compounded climatic effects as well as perpetuated upland ecosystems of grass and heather moorland in many areas. In particular, it will focus on attempts under the heading of 'development' and 'growth' to squeeze more goods and services from the existing pattern of upland land use.

Measures to increase economic throughput in the uplands have taken a number of forms. Historically, the first major change was tree felling on such a scale as to deforest almost completely a once largely wooded environment. However, it is in this century that a series of quite rapid developments have taken place. The scale of afforestation in particular has increased dramatically since the First World War, significantly changing the landscape of many areas. In other areas, there has been a widespread conversion of moorland to grazing pasture to support more sheep. This has included ploughing up rough pastures and reseeded them with rye grass monocultures aided by herbicide sprays and fertiliser dressings. Between 1967 and 1978, moor or heath converted to enclosed pasture increased by eleven fold compared with the increase over the past 95 years. Stocking densities in the areas analysed in the *Upland Landscapes Study* increased between 1955 and 1976 by some 80%.

The impact of grazing is amplified in some areas by burning to create more suitable ground cover for not just sheep but also grouse and deer. Large-scale and/or repeated burning can reduce the supply of soil nutrients such as phosphorus, create soil erosion and increase the sediment in local streams and rivers. Red deer in particular have become a serious problem in some areas. In the Scottish Highlands, for example, the number of red deer increased from some 155,000 in 1955 to 300,000 in 1990. Surviving patches of the old Caledonian pine forest have been hard hit: 30% disappeared over the last 30 years primarily due to the impact of grazing by red deer. These sporting pursuits have led to other changes, in particular the construction of more bulldozed tracks across the hills to get participants, often rich businessmen, to their prey.

The last hundred years has witnessed a significant change in not just the intensity but also the variety of human impacts upon the uplands. There has been, for example, the growth in the tourist industry with new roads, bridges, hotels, ski lifts and other facilities, most notably in the Aviemore area of the Scottish Highlands. Linked with leisure is the expansion of peat cutting to supply urban gardeners. The Highland Regional Council, for example, proposed to exploit the peat resources of the Flow Country, an area of international biological importance and already the scene of conflict over afforestation.

The exploitation of upland topography and climate to supply water to distant urban centres is another area where there has been considerable expansion in the last few decades. The origins of this

particular use go back to the last century with the tapping of Welsh water by Liverpool and Birmingham and of Lake District water by Manchester. The pattern has continued in the same 'supply side' technological fix characteristic of Industrial Growth Society. In the 1970s, for example, a number of large new reservoirs were constructed and older ones expanded. Significant areas of the uplands were, before privatisation, owned by the various Water Authorities, including 39,000 acres in the Lake District. Haworth Moor of 'Wuthering Heights' fame, for example, was owned by North West Water.

In the coastal waters of the uplands of western Scotland, fish farming has also increased dramatically from no fish cages in 1965 to 320 in 1985. Quarrying and mining are significant in several localities, including some parts of the National Parks, for example limestone quarrying (Brecon Beacons, Peak District and Yorkshire Dales), potash mining (North York Moors), fluorspar working (Peak District) china-clay extraction (Dartmoor), slate quarries (Snowdonia and Lake District) and even gold extraction (exploration near Tyndrum on the upper Tay). Military use is made of many areas, ranging from artillery ranges to overflying by jet fighters. As well as military radar stations there are also many civil communications facilities such as television transmitters. Other developments have included major road works which have included the A66 in the Lake District, the Oakhampton bypass and the A361 North Devon Link Road in Dartmoor. Finally there have been attempts to create nuclei of industrial development ranging from hydroelectric and nuclear power plant to paper mills and aluminium smelters.

Particularly important to the momentum of increased throughput has been assistance to less favoured areas which has sought to increase production. This has not only led to the displacement of human labour via mechanisation but has also led to overgrazing. Tax concessions, price guarantees, specially favourable grants for less favoured areas and headage payments for livestock provide a package for changing the face of the uplands. At 1978 prices, a farmer who converted heather moorland in the Exmoor National Park for grazing, for example, could expect to earn an extra £50 per ha each year. Not surprisingly, 20% of Exmoor's moorland has been lost since 1960.

The uplands of Northern England provide examples of many of these developments. They have included the creation of the biggest continuous block of coniferous plantation in the country. Within the Northumberland National Park, for example, commercial plantation, mostly held by the Forestry Commission, comprise some 20,000 ha, expanding from 10% of the Park's area in 1956 to 20% by the 1980s. and then in more recent years the country's largest reservoir at Kielder, originally to supply the demand projected from industrial growth on Teesside then increasingly marketed as a leisure attraction. The construction in Upper Teesdale of the reservoir at Cow Green, a site of many rare plant communities and designated in part a NNR and the rest a SSSI, was a particularly revealing illustration of the clash between the pursuit of more water at the expense of nature conservation.

Large parts of the area are used for military training (over 20% of Northumberland National Park). Open cast mining operators are developing new rural sites in the western and northern parts of Northumberland, despite opposition from the Countryside Commission in the case of the Plenkeller development and, with regard to the Wandylaw Moor, from the Nature Conservancy Council, the local Wildlife Trust and other groups. The country town of Hexham, which has doubled in size since 1974, has become home to the controversial Egger chipboard plant.

In several parts of the area there is pressure to build more 'executive' country housing and more leisure facilities (e.g. the development of luxury chalets and golf at Slaley Hall and a big expansion of caravan parking at Wooler). For a period, there were proposals to store nuclear radioactive waste beneath the Cheviots while, towards the end of 1990, there dawned the possibility of exploration for oil near Hadrian's Wall in west Northumberland.

'Development' dead-end

However, the conventional approach in regional development does not 'cure' the recipient region. Instead, it usually aggravates old ills and creates new ones. The impacts of these developments seems far from sustainable. The problems generated by the initial deforestation - soil erosion, depletion of soil nutrients, increased water logging and generally lowered productivity - have not been reversed and have got worse. All the developments tend to diminish biodiversity.

The most serious long-term threat to general sustainability would appear to be the decline of upland soil systems. Peat development, podsolization and soil erosion appear to be widespread. The unrestricted grazing of livestock and game has intensified the downward spiral of upland vegetation and soils. In many areas, species- and nutrient-poor grasses and sedges have spread. Even when there has been planting of rye grass to support more productive livestock, there seem to be trade-offs in terms of decreased hardiness, lowered resistance to disease and to the effects of trampling characteristic of the vegetation it replaces.

Evidence of unsustainability comes in other ways. The RSPB study *Hill Farming and Birds* (1984) also cites reduced bags of game birds while others have pointed to falling lambing rates in many areas. Even the over-populous red deer represent a declining resource insofar as they are very poor specimens of their species. The encroachment of bracken in many areas might also be regarded as the symptom of a general deterioration. Bracken is a poor food source and a suspected source of carcinogens. Bracken invasion leads to a reduction in both species diversity and biomass production. The annual rate of bracken expansion for the UK as a whole is roughly equivalent to the rate of land loss to either urbanisation or afforestation. Both grouse and sheep monocultures seem to have contributed to the bracken problem. Indiscriminate muirburn also weakens heather, allowing bracken to take over since the latter takes over by means of a fire resistant underground stem. The contraction of the upland cattle economy has also favoured bracken since suppression by trampling from cows is reduced.

There seems to have been a general decline in the diversity and abundance of the flora and fauna of the uplands. This problem originated with the original forest clearances. The description by Robertson of the Scottish Highlands seems to be only a microcosm of a general trend that happened earlier elsewhere. 'Once each and every Highland glen was thickly wooded and the red deer, now a lean and rangy beast of the open moor and hill, was then a forest animal, its numbers held in check by wolves. Eagles and buzzards ranged across great woods that stretched from the Atlantic to the North Sea and out of which the high hills protruded like islands in a dark green ocean. Bears rummaged among the trees. Wild boar churned up the underbrush.' Bears became extinct in the 9th or 10th centuries, reindeer in the 12th or 13th, elks at the beginning of the 14th, beaver in the 15th or 16th and the last wolf died probably in 1743. These changes are put into a stark light when set against one of the least modified forests left in Europe, that of Bialowieza Forest in eastern Poland. It still has populations of elk, beaver, otter, red and roe deer, wild boar, pine martin, and polecat. Bison still roam the forest along with lynxes and wolves. There are over 220 species of birds.

Though the habitats created by the destruction of the wildwood sustained a lower level of biodiversity, the uplands nevertheless still supported a distinctive range of plants and animals. Many are long-standing and age seems to have added diversity, particularly when the human usage was slow and did not involve use of agrochemicals. These include some internationally significant populations of birds. They support, for example, some 25% of Europe's peregrine falcons and 15% of her golden eagles. Some 10% of the world's peat bogs also occur in the British uplands. These environments are also comparatively free of the water pollution and other detrimental impacts associated with agricultural intensification on the lowlands. However, further losses in biodiversity seem to be happening as a result of the developments described above, including associated effects such as the persecution of predators by sheep farmers and gamekeepers.

Upland heaths are one habitat at risk. In Dumfries and Galloway, for example, some 90% have gone since the mid-1950s. 45% of limestone pavements, characteristic of areas such as the Yorkshire Dales have been destroyed. Only 3% remain completely undamaged. The raised bog at Fens and Bettishall on the Shropshire/Clywd border and part of a SSSI, illustrate the significance of that habitat with its rare plants such as white-beaked sedge and bog rosemary, 17 species of dragonfly, numerous butterflies and breeding curlew, snipe and nightjar. This particular site is at risk from peat extraction by Croxden Horticultural Products.

Indeed, many other habitats designated as SSSIs are also not adequately safeguarded. 33% of SSSIs in Northumberland, most of them in the uplands, have been destroyed in the last 15 years. The flora and fauna associated with upland environments suffer accordingly from changes in land use and management practices. Many mountain species of flowers such as blue heath, *Diapensia* and the Snowdon lily are threatened.

Bird species have also been hit. Merlins in particular seem to have been badly affected by both the loss of heather moorland and possibly pesticide poisoning while golden eagles, hen harrier, red grouse, black grouse, golden plover, greenshank and dunlin, ring ouzel and twite are at risk from a significant reduction in their numbers (RSPB, 1984). River wildlife is not safe. Otters, for example, have not just disappeared from many lowland rivers but have also declined in many upland areas, though re-introduction schemes may be altering that picture.

Though agricultural reclamation and afforestation may benefit some species, for example attracting animals such as wood mice and shrew and, in turn, encouraging more predators like fox and owls, special areas of biological richness such as upland meadows have suffered badly. Such habitats host a wealth of flowering plants and grasses which the application of fertilisers and herbicides reduce dramatically in a few years.

Overgrazing in particular has had quite drastic effects on the regeneration of old woodland areas. An example is the parlous state of the rich and varied remnants of deciduous woodland in Snowdonia

from the effects of grazing upon tree seedlings which threaten a habitat possessing a 10,000 year lineage with extinction within a hundred years. In some areas, individual species may have suffered from both the disturbance of nesting sites and the changes in vegetation consequent upon overgrazing, including possibly the disappearance of ptarmigan from south-west Scotland. Excessive muirburn has also impoverished moorland flora and decreased the numbers of fauna such as mountain hares particularly in the west and north of Scotland.

The construction of reservoirs, the extraction of water from natural lakes and the transfer of water between catchments can have adverse impacts on local hydrology and local wildlife. The problem is not just the impact of the flooding of land under water per se which may destroy important habitats such as breeding sites for species like toads. Changes in the level of the lake and in water downstream may be particularly significant, not least with respect to the migration of fish such as salmon. Fluctuations of water levels encourage soil erosion around the edges of lakes and reservoirs, creating an almost lifeless zone lacking in plant and animal life, as apparently has happened at Thirlmere and Haweswater in the Lake District. The impact upon aquatic macrophytes can reduce primary production and nutrient cycling, undermining the stability of the lake ecosystem.

Though pollution is obviously far less of a problem compared to intensive agricultural and urban areas, it too has become a worry in some areas. Sometimes it is a residue of past exploitation, most notably from mining for lead and other minerals in areas such as the North Pennines. The use of toxic compounds in sheep dips has also caused water pollution. Forestry is another source of pollution, including the aerial spraying of pesticides. Herbicides also join the food chain through attempts to control bracken by chemical means.

Mining and quarrying can also cause many problems. According to a report in 'New Scientist' (13/05/89), for example, some 60 million tonnes of limestone were extracted from the Mendip Hills in the 200 years prior to 1966 but in the following 22 years, some 190 million tonnes more had gone, to the cost of not just landscape quality but also the contraction and pollution of local spring water as well as a reduction in local flora and fauna such as wild orchids and Cheddar pink. The disposal of solid wastes is also a serious problem in some areas. Some 95% of the material from china clay pits is dumped as spoil while over 90% of slate rock is waste.

As a result of all these changes, it is difficult, for example, to imagine that many upland areas would be able to rival this gamekeeper's bag from a single estate in the Grampians as late as 1840. His log records: 246 pine martins, 78 martins, 198 wild cats, 71 short-eared owls, 106 polecats, 63 goshawk, 67 badger, 35 long-eared owls, 48 otters, 27 sea eagles, 475 ravens, 18 ospreys, 462 kestrels, 15 golden eagle, 371 rough-legged buzzards, 11 hobbys, 285 common buzzards, 6 gyrfalcons, 275 kites, 5 marsh harriers, 98 peregrine falcons, 3 honey buzzards, and 92 hen harriers.' Richard Gilbert, a hiking correspondent who quoted these figures in his column in *Walking World*, goes on to note that on a walk today in the same area: 'I considered myself lucky to see several herds of deer, a golden eagle, a heron, a pair of red-throated divers and a dipper.' Alasdair MacLean in *Night Falls on Ardnamurchan* (1984) paints a similar picture of land further west. 'In this ten years (from 1970), I saw my last molehill and my last roe deer. I heard my last corncrake. I bade farewell to woodcock, partridge, pheasant and sand martin. There were eagles as close as Plocaig once: not any more. I came across my last peregrine during this period: it was dead.. Sanna is a bare place now stripped of much of its cover and many of its inhabitants and deprived of many delightful creatures'.

Social Decline

Parallel problems seem to exist with respect to social and economic sustainability. Many areas support far fewer humans than was common for many centuries and the drift of especially young people from the uplands does not seem to have reversed. The number of upland farmers has contracted due an increase in the size of farms, growing by an average of some 56% in non-afforested areas. The rate at which farms were being amalgamated into larger units more than doubled during the 1960s compared with the previous decade and it continued to increase in the 1970s. In Snowdonia, 79% of full-time and 70% of part-time workers jobs disappeared between 1965 and 1972 while on Exmoor and Dartmoor, 66% of full time jobs were lost between 1952 and 1972. Employment has contracted in forestry as well as farming.

The same trend can be seen in mining and quarrying. In the Peak District, for example, production has increased rapidly yet the number of jobs in stone mining and quarrying in and around the Peak fell by a fifth between 1961 and 1971 due to the use of more mechanisation. Large construction projects such as Kielder dam, the Loch Kishorn oil platform construction site and the Dinorwic pumped storage scheme in Snowdonia also tend to be temporary in nature using outside labour. More generally opportunities for women also seem to be worse than those for men.

Since the Industrial Revolution and, particularly in Scotland, since the expansion of sheep farming after the Highland Clearances, there has been a drain of human resources out of the uplands to the lowland cities. In 1950, less than 5% of the population lived in the uplands compared to 20% 200 years before. Though depopulation per se seems to have levelled off, the age structure of local communities is tending to get older.

Indeed a vicious cycle seems to be at work in which the number of school children falls, schools are shut, people with young families move out and shops, bus services and other facilities decline through lack of support. At the same time, the cost of goods on sale in local shops tends to be considerably higher than in the cities (even for produce that is grown or reared in the locality).

In many areas the housing stock is not only poor and limited but also vulnerable to 'gentrification' as urban commuters and second homers look for rural retreats. In Gwynedd, for example, there are twice as many holiday homes as there are families on the council waiting list (Norton-Taylor, 1982). The focus on growth centres, particularly in the Scottish Highlands, seems to have aggravated the drift of people away from more remote areas, albeit to a closer destination. Cultural diversity is also undermined by the import of more homogenous lifestyles and values.

Both farming and forestry are heavily subsidised. These payments accounted for 75% of total net farm income of upland farms in the mid-seventies. The economic framework of upland farming has also been socially inequitable since most seem to have gone to bigger farms. Those on the best land, for example, received four times as much as those on the worst; 30% of the money goes to 6% of the farmers. Though the real value of headage payments has decreased, the European Community sheepmeat regime has provided extra incentives for production, especially in the agriculturally more favourable environments of the uplands. Since costs are rising faster than income, many upland farmers are being left with smaller net margins and a heavier burden of debt.

Big industrial projects have proved equally vulnerable, in particular when they are not rooted in a sustainable use of a local resource. In the case of the Scottish Highlands, the failed aluminium smelter at Invergordon was based on imported raw material again to supply faraway markets. Such projects also absorb scarce funds (this development cost some £37 million) and are capital-intensive, creating comparatively few jobs. In cases where ownership is from outside the developing area, profits tend to be left or accrue to wealthy individuals. The leading beneficiary of the royalties paid by Tarmac Roadstone in the Peak District was the Duke of Devonshire (Shoard, 1987). Sometimes this process creates strange anomalies. For example, the water rates of locals living next to reservoirs in upland Wales have been considerably higher than those of consumers in distant Birmingham.

Conventional developments also seem to create new or reinforce old dependencies. The rural economy has integrated itself into a situation of submission and vulnerability to a set of larger and more powerful urban economic forces. Nothing illustrates this more than that most basic resource, land. Here ownership is highly inequitable, concentrated in a few hands (and increasingly, though not yet significantly a few institutions). In Northumberland, for example, the Duke of Northumberland owns some 105,000 acres while across the border the Duke of Buccleigh possesses 277,000 acres, mainly in the southern uplands. 'Absentee' landlordism remains a serious problem, especially in the Scottish Highlands. The Dutch have been in the vanguard of an increasing number of foreign owners. The same problem of concentration and control from outside can be seen in specific sectors. In mining and quarrying, for example, control has shifted to big transnational corporations like Rio Tinto Zinc and Consolidated Goldfields. Fish farming on the west coast of Scotland is also often in the hands of wealthy outsiders. As in private forestry, this has included its share of rich pop stars like Ian Anderson (Jethro Tull).

Nice Views

The 'reformist' response seems to be centred on the environment as it exists. It looks at features worthy of defence or enhancement. All uses are treated as equally legitimate, to be judged largely on subjective grounds. Game management, for example, is often discussed without relating the issue to its social context, particularly land ownership and to the class structure of the countryside.

Many conservation-oriented studies and programmes have focused upon the preservation of the look of a cherished landscape. Their common perspective is an integrated approach, using headage payments, capital grants and multi-purpose management plans and other devices could be used to maintain the buildings, walls, hedges, traditional meadows and the other components of landscapes under threat, particularly from changes in farming and forestry practice.

The Hartsop Valley Study (Countryside Commission, 1976) is about the identification of how to 'maintain the details of the landscape', provide for 'public enjoyment' of it' and, at the same time, conserve a farming economy based around livestock, particularly sheep. Tree-planting is discussed largely in terms of the 'strengthening and preservation of *existing* elements' (p87, our emphasis), for

example to screen visually intrusive developments, though, earlier (p6), the Report notes that the Lake District as a whole was once 'covered with extensive natural forest up to about 1,500'..largely of deciduous species'.

Far from regarding the uplands as a 'wet desert' (Fraser Darling), many environmentalists cherish its appearance. Price (in MacEwan, ed., 1976), for example, indicts the planting of the Irthing Basin in northern England as a loss of 'one of the last few wilderness voids'. Blacksell and Gilg (1981) claim that the main value of the uplands is their 'wildness' (p225). Lowe (1986) warn specifically of the dangers of understocking of sheep in case 'it upsets the traditional balance, allowing the vegetation to revert in time nearer to its natural climax'. Tompkins (1989) also laments the loss of 'the silent heart of the hills' and their 'atmosphere of freedom and unspoilt nature' where there has been 'a quiet evolution of a centuries old system of sheep farming'. Though he suggests that the Flow Country is in the state more or less as left by the last ice age, he seems to subsume specific environments whose value is widely recognised and whose condition could be said to be fairly 'natural' beneath the uplands as a whole which might be said to be semi-natural but, as ecocentric writers discussed later argue, are also the product of a long and intense environmental degradation in need of reversal.

Reformist environmentalism tries to seek an integration that achieves a satisfactory balance between competing uses, plus environmental impact assessments and appropriately adjusted cost benefit analyses. It is common to find calls for a more rigorous extension of planning controls, particularly with regard to afforestation. This approach also has focused upon the *appearance* of farms and commercial plantations, in particular the dark and monotonously regimented ranks of conifers with their straight geometry of boundaries and fire breaks. But in plantations not characterised by such geometric patterns and where more attention has been paid to the conservation of native woodland and features such as ponds, planting percentages could still be heavily weighted towards conifers, with even-aged Sitka spruces becoming even more dominant. Indeed, the Forestry Commission has responded to such criticism by feathering the edges of their plantations, more planting of hardwoods at visually significant locations and the leaving of clearings around pools and streams.

Similar concerns are found in criticism from organisations such as the Ramblers Association who lament the loss of the open vistas of unplanted moorland and the sense of freedom they bring. Shoard (1980) also defines the issue at a purely aesthetic level. 'The loss of roughland countryside is upsetting to almost all those people who comment on the change' (p64). Such sentiments are reflected in the stance taken by National Park authorities.

Regeneration

From a deeper environmentalist perspective, the above approaches fail to address the issue of what used to exist and what might be created nor does it identify any common denominator against which one use might be compared against another. With respect to the goal of integration, it might be argued that integrating several bad singers into one choir does not necessarily produce better sounds. The different needs that might be served by forests are still treated in largely segregated terms, ranging from nature reserve woodland to unrestricted timber production. Instead of trying to balance timber production, a deeper environmentalist perspective would start from a functioning 'whole', in this case a self-sustaining forest ecosystem, different parts of which can satisfy a multiplicity of different needs, not just timber. There have, however, been few attempts to provide a model of what an ecologically sustainable upland area might be and how human wants might be integrated around it.

The long-term solution for areas such as the British uplands is to look at what nature would create there and around that model begin to reorder human activities. Fortunately there are still surviving patches of the woodland that indicate flora and fauna appropriate to local topography and hydrology of the land and to the current geological and climatological era in which we live. Even more fortunately there are already initiatives underway, some connected to the Findhorn Community in northern Scotland that demonstrate that there is a better way forward than seen on today's barren hills.

Central to an ecologically guided regeneration programme for the British uplands will be the planting of the greater part of the region with a mixed forest, based on indigenous species. It would provide the basis for a sustainable rural land-use economy. A forest economy could yield a sustainable diversity of products as well as provide an incomparably more hospitable micro-climate and environment than presently afforded by the bleak and windswept moors. Furthermore, it could provide a massive new potential of spiritual and aesthetic rewards as well as help to provide habitats for a richer diversity of other creatures.

It would fulfil as well our global responsibilities towards climate stabilisation and the regeneration of a healthy balance of atmospheric gases. A recreated forest in the uplands would also take its place alongside other current initiatives in the world to reinhabit human-made deserts and would be an expression of solidarity with developing countries of the Third World. In total it would provide a rich

and sustainable resource for its inhabitants, living in greater harmony with each other and the land, under new forms of land stewardship which allow for the growth of more uncompetitive, stable and unexploitative relationships.

A forest economy would comprise an enormous range of tree and shrub species, providing a correspondingly great range of food (animal and vegetable), fodder, fuel, timber, industrial, craft and even medicinal products. A lot can be learned from the best aspects of forest resource usage current in places like Scandinavia and Switzerland as well as from the historical past of the first Wildwood itself. Animal produce would divide into domestic and wild with a far greater relative dependence on the latter than at present. In contrast to the extreme paucity of wild game taken from the land today, the forest economy would yield up a much increased range, quantity and quality of animal products managed by local communities to supply food, in the first place, to themselves.

Domestic stock might include cattle, both Highland and other breeds able to thrive by virtue of the better micro-climate and pasture. Cattle in the forest economy would provide local sources of dairy produce as well as useful organic fertiliser for many horticultural, agricultural and arboricultural practices. There would be sheep, confined along with the cattle, to improved pasture with breeds producing good wools for local spinning and clothes manufacture. It would include free-range pigs, pens, ducks, geese and other fowl suitably combined on some small forest-farm units.

The forest farm would be different from the typical farms and crofts we see in today's uplands. It would have diverse interests, operate at quite a small scale and give to its inhabitants a healthy and fulfilling livelihood. It would be intensively managed, serviced by modern but appropriate machinery. Crofts and small farms would be scattered throughout the forest, naturally clustered on the richer soils, often in the bottoms of glens and much resembling their pre-Clearance distributions found in the Scottish highlands. There would be small, well-fenced or dyked fields with a great deal of improved pasture. Trees around all the fields would constantly fertilise the pasture with leaf litter. Some mature areas of forest would be opened out to form rides and glades where some herbivores would graze freely, being able to move in and out of the shelter of the trees.

Some arable farming would take place. Sufficient roots, hay, silage and other fodder crops could be grown to feed the domestic animals the whole winter through. Good accommodation (perhaps communally managed) on site in the forest for the domestic animals would eliminate the need for any to be taken elsewhere—a wasteful and expensive current practice in some areas. There would be an abundance of vegetable crops suitable for immediate local human consumption. Some specialist vegetable and fruit growers might employ polythene tunnels in clearings in the forest benefiting from the tree shelter in high winds but most vegetables would grow well in the open in the litter fertilised soils, protected by the trees. A great deal of fruit growing would be integrated into the forest itself. In thinned forest, fruit bushes would be the understorey and fruit trees interplanted amongst suitable 'wild' trees. All would benefit naturally from the protection and fertilisation of the forest trees.

The management of the forest for a multitude of purposes would yield up an adequate harvest of firewood as general domestic fuel. Most houses would have efficient, modern solid-fuel stoves giving space and water heating as well as cooking facilities. Heating requirements would already be somewhat reduced due to the favourable micro climatic effects of the surrounding forest and improved insulation and building design. It seems sensible that, frequently, the firewood resource would be co-operatively managed, the community employing some members to carry out this function for all. It is certain that, in a forest economy, domestic heating bills would be a fraction of what they are today.

To ensure that local resource depletion do not occur, some forest townships and industries might need to grow a special biomass fuel crop, e.g. osier or willow plantation to help run a local combined heat and power scheme. The overall business of power generation could be run more efficiently and rationally than at present by Local Energy Authorities as part of local government. These would be empowered to develop whatever energy sources they might find appropriate to their needs and environment. By the time the forest economy is in full swing, electricity generation is likely to come from about six, and domestic heat from about twelve, different sources. These would represent industries employing more people than are presently employed in the energy industry and in a thoroughly dispersed employment pattern. The power supplied would be considerably cheaper and safer due to the ecotechnologies involved. Nuclear power generation would become even more of an unnecessary encumbrance of the past than it already is. The use of wave energy to generate electricity would play an important part in the economy of coastal townships and, increasingly, power would be generated by local wind and small-scale hydro schemes. Biogas digesters on many farm units would generate both heat and electricity in small schemes.

Within the forest, some areas would be designated primarily structural and/or pulp growing areas. The community would manage these by careful selective thinning and felling for its building and paper manufacturing industries. Unlike the monocultures of today, these would be of truly mixed species

tending to rely on Native Scots pine as a softwood instead of exotic species. Clear felling would become a thing of the past, a primitive and unnecessary practice belonging to a time when forests were of an even-aged structure and commercial interests were allowed to exploit the land for what they could get with no concern for other land uses, present or future.

A diversity of small manufacturing and craft industries would feed off the forest woods. Kitchen utensils, bowls, plates and other household implements would be made from locally cropped woods. Furniture and cabinet-makers would exploit the particular qualities of the woods available in their areas. In the place of today's laminated chipboard and plaster board there would be good solid Scots pine surfaces and lined walls; warm, insulating and beautiful; products grown and crafted locally within the community. Not just a luxury for the wealthy but as the Scandinavians take for granted as part of their forest economy. Other specialist craftsmen would occupy still further economic niches, making musical instruments, boats, toys, tools, charcoal and artworks. The present small rural industries, e.g. fencing and dyking, would flourish and whole new ones would spring up. For instance nurseries would grow and develop trees, bushes and plants of all types for a wide range of forest industries and arboricultures.

The forest economy would not only differ in many biological and physical aspects from the present rural land-use economy but would also differ in its social and political structure. The second cornerstone of the Greenprint for the future - no less important than the establishment of ecologically sustainable productivity bases—is the establishment of more fully participatory local government, local taxation and community stewardship of land.

Eventually, the Forest Economy would 'belong to' (in as much as land can ever be the property of people) all who dwell in it. The people who work the land would be the tenants of the community. Rather as in existing crofting situations in the Highlands, tenants would retain control over their businesses on the forest croft or farm - a limited area of land near the home stead. Other activities requiring or benefiting from communal organisation would take place off the croft or farm on the rest of the land stewarded and governed by the local community—the equivalent of present-day common grazings but indefinitely extended and again. Instead of belonging to an estate, the land would belong to the community itself.

The bulk of enterprise on this common land would be communally managed, some by the community as a whole, e.g. firewood and wild game, others by co-operative businesses. Such types of financial arrangement would become the norm rather than the exception, tending to naturally evolve in direct response to the civilised and equitable progress of land reform. Communal stewardship inspires co-operative management and business arrangements.

So the forest economy could be created, transforming one of Europe's most severely ecologically and economically disadvantaged regions into one of lasting ecological and social stability and well-being. A distantly-governed and grant-manipulated society would be transformed into an economically viable, self-determined and just one. And it would be a region of great beauty too.

Sandy Irvine