



Sustainable Management of Temperate Forests

Introduction

Forests cover about 30% of the world's land area and are a very important natural resource. Forest products are important in building and construction and the manufacture of furniture, pulp and paper and are an important source of income and employment in many countries (see Table 1). Forests also have a great ecological importance and are the habitats of many thousands of plants and animals. They also use up vast amounts of carbon dioxide every day in photosynthesis and their removal has been linked to increasing levels of this gas in the atmosphere and to global warming.

Table 1 The Timber Industry in Selected Countries.

Type of data	UK	Sweden	Finland	Russian Fed.	Canada	USA
Roundwood (000s m ³)	128	6466	10106	787	6576	1798
Fuel (000s m ³)	4	422	812	249	183	293
Paper + paper board (000s metric tonnes)	110	1061	2353	23	673	287
Wood-based panels (000s m ³)	46	104	307	23	385	146
Imports (millions of \$)	165	159	150	43	123	88
Exports (millions of \$)	35	1160	2115	20	869	67
Timber + timber products as a % of total exports	2	10	22	3	10	2

N.B. The above data are calculated per head of population for ease of direct comparison

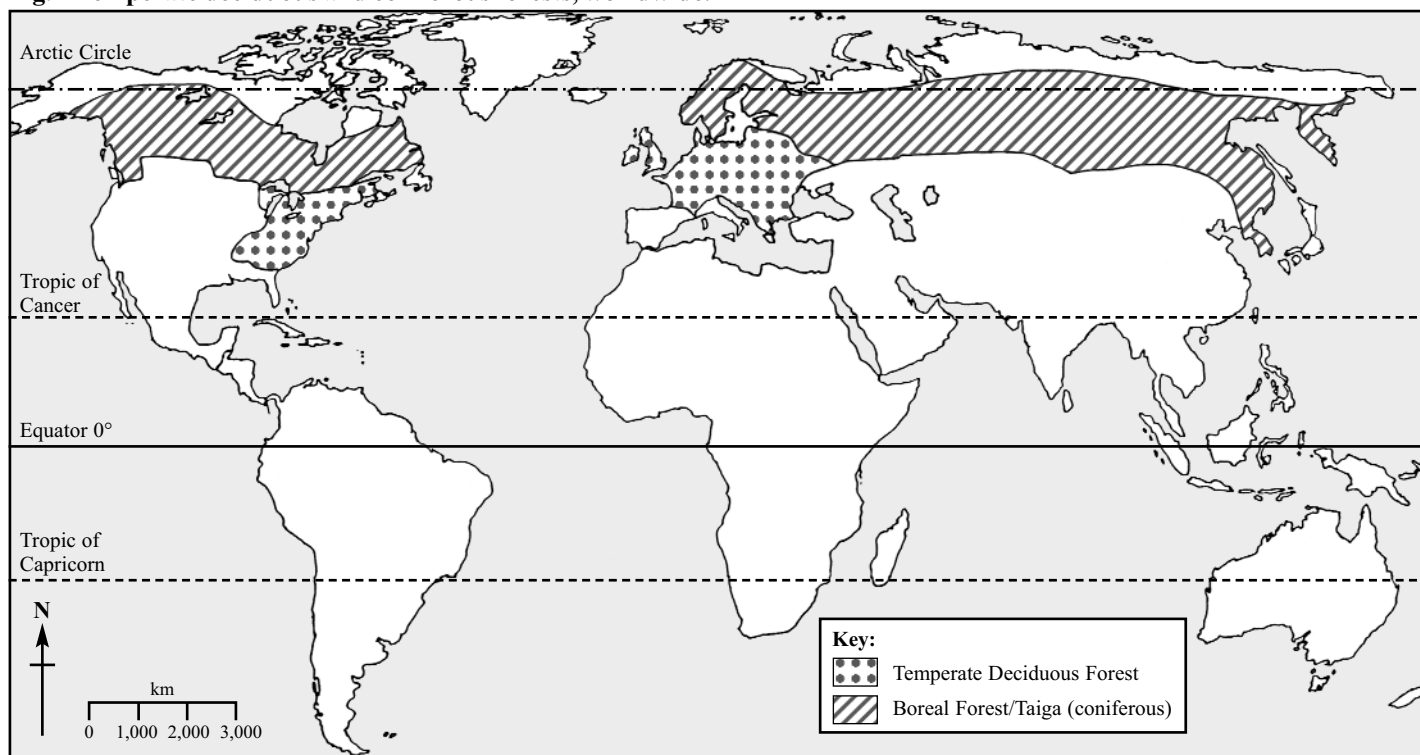
There are two main types of forests - tropical and temperate. This Factsheet focuses on temperate forests, which make up 44% of the world's forest cover. The main areas are the vast coniferous forests of Russia, Canada and Northern Europe known as the Boreal Forest or Taiga. The USA and southern parts of Europe also have important broadleaf, deciduous temperate forest areas (see Fig. 1).

These vast temperate forest areas have been used throughout history as a source of wood with little thought for the availability of supplies in the future. However, over the last twenty years or so, there has been increasing concern about the rate of, and practices involved in, forest removal and management and the environmental effects of this commercial exploitation. These include:

- The coniferous softwoods of the taiga are increasingly being used as a 'pulp factory' providing raw materials for the paper industry. Paper consumption increased twentyfold during the 20th century and is set to grow by another 80% based on 1993 levels by 2010!!
- Poor timber industry methods e.g. over-harvesting of industrial wood and other forest products, large-scale clear-cutting, mismanagement of production forests, etc. result in forest degradation.
- Re-afforestation often involves planting non-native, (exotic) trees, often in large man-made plantations made up of just a few species. The original ecosystem is thus completely altered, often resulting in a reduction in biodiversity.
- This 'monoculture' often results in pest infestations, e.g. pine moth and spruce beetle, which necessitates the use of pesticides to control them.
- The introduction of new species can affect the soil characteristics, e.g. coniferous trees planted in an area previously covered by deciduous ones can result in acidification of the soil. This can further affect the plants and animals living there.

By the close of the 1980s many countries felt that something had to be done about people's use of the world's forests. In 1993 the Helsinki Conference on Forestry discussed many of the issues, and guidelines were drawn up for the sustainable management in forests in the future.

Fig. 1 Temperate deciduous and coniferous forests, worldwide.



What is Sustainable Forestry?

Sustainable forestry was defined at the Helsinki conference as:

“The use of forests and lands in such a way, and at such a rate, that maintains their biodiversity, productivity and regenerative capacity.”

Since then this definition has been expanded and it is now generally thought of in a wider sense as the use and management of the forests in such a way today that their environmental, social, cultural, recreational and economic characteristics are preserved for the benefit of future generations.

Sustainable Forest Management.

- Protection and conservation of forest reserves – the best examples to be in virgin forest of high bioquality. Reserves linked by natural corridors to guard against threats such as climate change.
- Use of buffer zones around reserves.
- Conservation and maintenance of forests on highly sensitive watershed areas.
- Fencing off key forest areas, such as natural or ancient woodlands, against animal grazing (a major problem in the Welsh uplands).
- Marketing and certification of sustainable timber products by ITTO, and the Forestry Stewardship Council (FSC).
- Avoidance of clear felling, maintenance of permanent logging roads, leaving trees to allow post-forest recovery – all aim to control post-logging soil erosion.
- Enforceable, locally agreed working plans for exploitation of forests such as felling cycles and management of forestry operations to sustain yields.
- Development of multi-purpose forestry including recreation, controlled hunting and zoning to avoid conflict.
- Development of urban forests.
- Empowering local people to develop extractive reserves; new initiatives such as beekeeping or butterfly farming; bio-prospecting to develop products from medicinal plants; value-added wood products.

Exam Hint: It is important that you can give a good brief description or definition of the main issues involved with sustainability as it is a very popular topic – think in terms of the sustainability quadrant (futurity, ecofriendliness, community participation and equity for poor people's rights - social justice).

Since the Helsinki conference much progress has been made as far as sustainable forest management is concerned.

- There is a much greater awareness of the value and the necessity for the use of sustainable methods of forestry in many temperate forest areas e.g. Canada and the UK.
- Reduced impact logging is used which involves avoiding large forest clearings and excessive tree removal for infrastructure etc.
- Re-forestation now includes more native species of trees.

Many organisations, both global and national, have been set up to monitor the management of forests and to ensure that forestry takes place according to sustainable criteria, e.g. the Taiga Rescue Network. Accreditation schemes have also been established to encourage the general public to buy sustainably produced wood products, e.g. the Forest Stewardship Council. People are also becoming more aware of the need for recycling of paper and wood products. Some countries are further along the path to successful sustainable management of their forests than others.

The degree and success of implementation of such strategies involves many issues, e.g. ownership of the forest. It is much easier to control the management of government or publicly owned forests than to change the ideas of the owners of those which are privately owned and where profits are often of the utmost importance.

Table 3. Protected areas of forest in North America, the Russian Federation and Europe by area (km²).

Region	Total Forested Area	Total Protected Area	Protected area as % of total area
North America	9,060,344	1,702,238	18.8%
Russian Federation	9,994,587	187,034	1.9%
Europe	1,870,000	212,372	11.4%

Table 4 Types of protected temperate forest areas in North America, Russia and Europe.

Area	Type of forest area					
	Evergreen Needleleaf	Deciduous needleleaf	Mixed Broadleaf/ Needleleaf	Broadleaf evergreen	Deciduous Broadleaf	Sparse Trees & parkland
N. America	23%	66%	11%	none	17%	14%
Russia	3%	1%	6%	0%	3%	2%
Europe	15%	none	12%	none	8%	13%

N.B. 'none' means that there is no forest of this type in the area; 0% means that none of that type of forest is protected.

Case Study 1: Forestry in Canada

It has been estimated that one acre of Canadian forest is cut down every thirty seconds and if all the trees felled there in one year were loaded on to trucks parked bumper to bumper, the line formed would stretch 2.5 times around the world!

The forestry industry is thus very important to the economy of Canada. It provides 3% of its GDP, 13% of its trade and 6% of its employment. It was estimated in 1997 that 63% of the vast areas of natural boreal forests in Canada had either already been felled or were under threat of removal. These forests are predominantly managed for timber and 50% are owned by a handful of large-scale companies. Under current management practices, harvesting rates are unsustainable in the long-term and since the early 1990s, the government, the timber industry and forest-related groups and organisations in Canada have been actively committed to sustainable forest management.

All harvested areas are promptly regenerated using methods that will maintain a diversity of plants and animals. It is estimated that Canadian forests contain over 27,000 species.

- The Model Forest Program, launched by the government, is aimed at 'addressing the challenge of balancing the extensive range of demands that we place on our forests today with the needs of tomorrow's generations.' In each of these 12 working models of sustainable management, several partners, with a range of interests and ideas, e.g. local people, private land-owners, scientists, environmental groups, local and national authorities, work together. They consider the needs of local communities and use the latest ideas in ecology, silviculture and harvesting techniques. These forests are continuously monitored and assessed.
- A National Forest Strategy has been set up which runs from 1998 to 2003.

Canada also actively supports certification and would like to see the creation of an international standard rather than national ones. Eco-labelling is used on paper products to inform the buyer as to the amount of virgin timber used in its manufacture.

This international organisation was founded in 1993 by environmental and human rights campaigners to:

“support environmentally appropriate, socially beneficial and economically viable management of the world’s forest.”

The FSC supports the establishment of national and regional standards to be used to evaluate the level of sustainable management of a forest. A management plan is drawn up and then the forest is monitored and assessed according to ten main principles including:

- the efficiency of the use of forest products and services to ensure their economic viability and a wide range of social and environmental benefits.
- the conservation of biological diversity, water resources, soils, fragile ecosystems and landscapes
- the consideration of the rights of the indigenous peoples
- the maintenance of the economic well-being of forest workers and local communities

If the forest meets the various sustainable standards it is allowed to use the FSC logo on its timber and timber products, (e.g. Body Shop hair brushes carry the FSC logo). In consuming countries, environmentally aware customers would be encouraged to buy such certificated products. In principle such a system is a very good idea but at present there is a widespread variation in the areas which are certified. Only 2% of the world’s forests are certified in such a way (Table 5).

Table 5 Areas of the World Certified by the FSC.

Area	Number of sites	% of number of world’s sites	% of area certified within world 2%
North America	99	26%	12.4%
Latin America	91	24%	13.2%
Europe	145	38%	67.3%
Asia-Pacific	25	7%	3.2%
Africa	17	5%	3.9%
The World	377	100%	100%

Case Study 2: Forestry in the UK

After centuries of tree-felling, the forest cover of the UK had been reduced to only 3% of its land area by 1920. In 1919 the Forestry Commission was established and re-forestation started to take place. At present forests cover 12% of the UK, a total of 2.4million hectares. Even so, the UK has the lowest percentage of forested land in Europe. Two thirds of these forests are privately owned and the rest managed by the Forestry Commission. Even though the amount of timber produced has increased, the UK still imports 85% of the timber that it uses and is the second largest timber importer in the world. 89% of this comes from Scandinavia, Canada and Russia, 3% from the deciduous forests of North America but only 8% from tropical areas. Increased sustainable hardwood production could replace non-sustainable imported sources from the tropics, e.g. mahogany, as well as giving new jobs and nature conservation benefits.

Until 1990, the trees that were planted were mainly exotic, non-native coniferous species; the UK only has one native pine tree, the Scots pine. The natural climatic climax vegetation of the UK is a temperate deciduous forest with oaks, limes, elms, ash, birch etc. These forests have an undergrowth layer, with plants such as bluebells and crocuses, which complete their life-cycle in the spring before leaves appear on the trees. It has been estimated that deciduous forests contain around 800 species associated with them, e.g. oak forests have 284, and birch forests 229. In contrast there is little undergrowth in coniferous forests due to there being less light and more acid soil conditions, resulting in far fewer species. A forest with predominantly Scots Pine (native) has 91 species present but a spruce forest has 37 and a larch forest only 17. The original ecosystem has thus been radically changed.

Since 1990, the UK has become more committed to sustainable forestry management. There has been an increase in the planting of native species and the maintenance of the original habitat and ecosystem as well as more emphasis on the recreational and cultural benefits of the schemes that have been introduced. Many of the new forests such as the Forest of Mercia represent current best practice with widespread planting of deciduous species. Fig. 2 shows some of the latest practice.

Fig. 2 Current forestry practice.

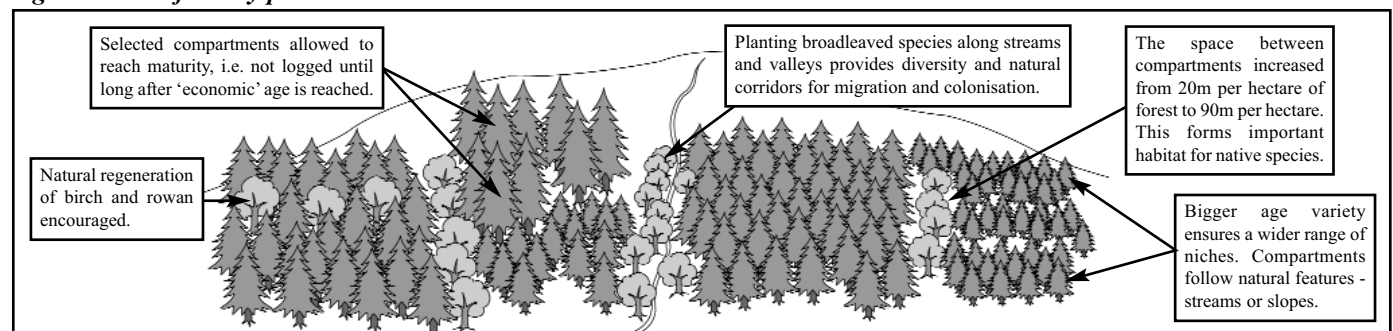
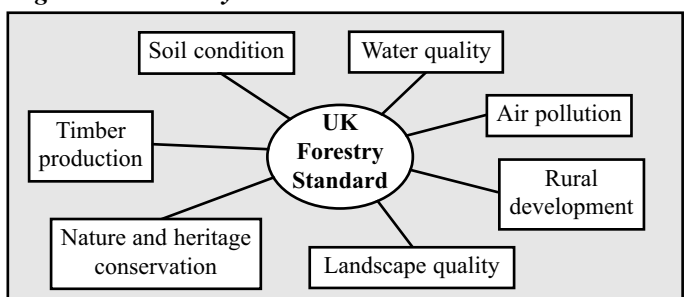


Fig. 3 The Forestry Standard Criteria.



There is now a published standard for all types of forests and woodlands in the UK covering several criteria (Fig. 3). Most of the UK’s forests are now multi-purpose. Recreation is an important use and over 22 million visits are made to forests for this purpose. Forests currently provide 10,000 jobs in the UK and £800 million a year of economic activity is provided by them. Some of the main forested areas are to be found in Scotland, which has nearly one fifth of its areas under trees. In December 2000, the Scottish Forest Industries Cluster was established. This has sustainability at its heart and is made up of over one hundred companies, environmentalists and organisations linked with planting, management and harvesting.

The Forestry Commission has received a ‘Gift to the Earth’ award from the WWF for its sustainable forestry management in Scotland and the setting up of independent certification. The UK is the only country in the world where the entire area of publicly owned forest has been certified to FSC standards.

The UK Soil Association also set up a Forestry Programme in 1992 to certify timber through the Woodmark Scheme. This involved setting six standards to define acceptable forestry practices, followed by an inspection to check whether or not these were being met. These standards are based on the idea that timber production will cause some ecological changes but that these must be managed and minimised to ensure the maintenance of a healthy forest ecosystem and benefits to the communities and society as a whole.

Taiga Rescue Network (TRN)

The TRN is an international non-governmental organisation (NGO), based in Sweden, with over 150 members such as environmentalists, local people and scientists. It was set up in 1992 to:

“create a co-ordinated response to growing concerns with social, economic and environmental degradation that is occurring in the forest.”

The TRN supports and publicises local conflicts and problems within the forest communities. It undertakes research, publishes news sheets and supports the certification programme of the FSC. The Boreal Forest Network was set up in 1994 and is the North American branch of the TRN.

Case Study 3: Forestry in Russia

Russia contains approximately half of the world's temperate forested areas, a total of 763.5 million hectares (an area thirty times the size of the UK). These provide a vast forest resource of both ecological and economic importance. Most is owned by the State Forest Service and presently about 75% is still in its natural state due to:

- harsh climatic conditions in the areas covered (a coniferous tree can take over 100 years to reach maturity here but only half that time elsewhere in warmer areas.)
- the remoteness from domestic and international markets
- the lack of a good widespread national road and / or rail network
- technological limitations of felling the trees

However, those areas that have been developed show that bad forestry practices are often present with large-scale, clear-cutting and poor re-forestation methods. It is vital that any future development takes place along the lines of sustainable principles.

Russian Legislation in the 1990s has focussed more on these issues including the Forest Code in 1997. The government also tries to encourage the use of timber from certified or well-managed forests and to avoid the use of forests of great economical and social value. One constraint is the decline in the Russian economy, which means there is an incentive to exploit timber as a vital export to compare the trade deficit.

Exam Hint: Case studies are always needed to support your general points. Try to know at least one in detail to illustrate your answer in an exam.

Conclusion

The last ten years have seen an increased awareness of the effects of man's use of the temperate forested areas of the world. Conferences have been held, organisations have been established and much has been written on the issues involved. It is now vital that the criteria for sustainable forestry management that have been suggested are implemented in order for the forests of today to be available for the enjoyment and use of future generations.

Useful websites

www.ierm.ed.ac.uk/research/sucre/cons4.htm good definitions and list of important organisations

www.gn.apc.org/reforestingscotland/info.html

www.sfms.com/fsc.htm Forest Stewardship Council

www.taigarescue.org/ Information about the organisation.

www.blackcountryurbanforest.org.uk/blackcountry Information about urban forests

www.nufu.org.uk

Exam question

- (a) (i) What is the meaning of sustainability?
(ii) How might a government develop sustainable forest management over a period of time?
- (b) Using Fig. 2, what are the main reasons why the Russian Federation has such a small protected forest area?
- (c) Using the data given in Table 1 choose two countries and contrast the importance of the timber industry to their economies, giving reasons for your answer.

Answers

- (a) (i) See text in Factsheet.
(ii) A government could adopt the following methods to gradually introduce sustainable forestry management in its country.
- ensure that future planting of trees focuses on the use of native species and the maintenance of the original ecosystem and environment.
 - establish a list of sustainable forestry criteria which forestry owners can refer to and work towards
 - monitor and assess the country's forests both public and private, (by legislation if necessary), using the feed-back to guide the owners and managers as to how future development should take place
 - establish systems of accreditation, ecolabelling etc. to encourage forestry owners and managers to produce wood and wood products from sustainable sources
 - educate and inform the public of the value of sustainable production and the relevance and importance of accredited sources.
- Any other relevant method.

- (b) Comment on the data given first of all. Russia has vast areas of forest very similar in size to those of North America but has a very small area and percentage that is protected. It has got a larger area of protected forest than Europe, which has only one fifth of Russia's total area. There could be several reasons for this:
- lack of development/ establishment/ enforcement of sustainable policies and practices.
 - although the forest is mainly government owned and controlled, which should facilitate the introduction/ expansion of sustainable ideas, there may be other priorities in view of recent political events etc.
 - the country has a vast area of forest and at present there does not seem to be an urgent need for such policies
 - the size and scale of the forested areas in such a vast, often inaccessible country with its harsh climate and poor infrastructure/ communications may also be relevant here.
- (c) Choose two countries and contrast the importance of timber to their economy. Finland and the Russian federation would be good examples to use here. Finland is obviously far more reliant on and involved in the timber industry. You could quote and compare the data and also try to account for the differences using the country's sizes, levels of development etc. The details depend on the countries chosen.

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This Factsheet was written by Bob Hordern, a principal examiner and author.

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