Sweden’s National Report

under the

Convention on Biological Diversity

Contents

Case studies

Executive summary

Structure of Sweden's national report

Sweden has been guided in the preparation of its national report under the Convention on Biological Diversity by the decision on national reporting taken at the second meeting of the Conference of the Parties. This report therefore focuses on

- the implementation of Article 6 on 'General Measures for Conservation and Sustainable Use', including integration into relevant sectors, and
- experience gained during the early stages of implementation of the Convention.

As part of the report, Sweden presents a number of case studies, all of which describe the specific lessons and conclusions drawn from efforts to implement the Convention. The studies cover different aspects and levels of biological diversity (e.g. 'wild' versus domesticated; genetic, species and ecosystem levels etc.), and also different sectors and geographical levels. In addition, a balance has been sought between conservation and use. A number of case studies describing development cooperation are also included.

Sweden is attaching to its report a number of other documents, including the Swedish Government's *Strategy for Biological Diversity*, the Swedish country study and a number of sectoral action plans, which also present measures with the aim of implementing the Convention. These documents complement the national report in various respects.

Background data

Sweden has an area of 450,000 square kilometres. Its ecosystems vary from oak, beech and other deciduous woodlands in the south to areas of tundra in the north. An extensive belt of boreal coniferous forest covers a large proportion of the country. Around 12 per cent of its area consists of mires of various types. Most of Sweden is relatively flat, but in the west, along the border with Norway, is the Scandinavian mountain range, with its alpine ecosystems. Sweden has more than 83,000 lakes, and the total area of lakes, rivers and streams is 29,400 sq km. The country has a long coastline, extending for roughly 7,000 km. Off the west coast are the Skagerrak and Kattegat, which form part of the North Sea. To the south and east lies the Baltic Sea, the world's largest semi-enclosed brackish-water sea. There are several large archipelago areas.

Forests cover 62 per cent of the country, and are one of Sweden's most important natural resources. There are around 2.8 million ha of arable land, which is about 6 per cent of the land surface. In addition, there are roughly 440,000 ha of non-arable grazing land.

In 1996, Sweden had a population of 8.8 million. Some 85 per cent of the population live in cities, towns and other settlements with 200 or more inhabitants. On 1 January 1995, Sweden became a member state of the European Union (EU).

Implementation in Sweden

The early stages in the implementation of the Convention at the national level in Sweden have consisted primarily of the following:

- ratification by the Swedish Parliament in 1993,
- adoption of the *Strategy for Biological Diversity* (1994),
- preparation of a country study (1994),
- presentation of sectoral action plans (1995) and
- the Government's responses to these action plans (1997).

Sweden's Strategy for Biological Diversity

The involvement of relevant sectors – both sectoral authorities and the private elements of the different sectors – has characterized the early implementation phase in Sweden. It was made clear in the *Strategy* that the following sectors in particular should be involved in promoting the conservation and sustainable use of biological diversity:

- forestry,
- agriculture,
- fisheries and aquaculture,
- reindeer herding and
- the building and physical planning sector.

Attention was also drawn to the importance of integrating the conservation and sustainable use of biodiversity in Sweden's development cooperation programme.

Other cornerstones of the *Strategy* are:

- Environmental objectives must be accorded the same weight and importance as economic considerations, in order to ensure an ecologically sound basis for human activities. This is reflected *inter alia* in the forestry policy decision taken in 1993, which establishes that, in forestry, production and environmental objectives are to carry equal weight.

- Action to maintain ecological processes and to safeguard the long-term survival of species should be holistic in its approach. The *Strategy* is underpinned by an awareness that the conservation of biodiversity is essential to the long-term productivity of ecosystems.

- Further substantial efforts need to be made to ensure greater environmental sustainability in agriculture, forestry, fisheries and reindeer herding, and to reduce the detrimental effects of pollution and development of land and water (habitat destruction). Consequently, biodiversity and sustainable use have also been taken into account in policy decisions on forestry, agriculture and fisheries. At the same time, it is necessary to increase further the area of protected land, not least in the forest landscape.

- In practical efforts to maintain biological diversity, the emphasis should be on the ecosystem level and on different habitat types and landscapes. Measures at the

species and genetic levels are also necessary, however. At the species level, the main focus should be on the habitats of the species concerned.

Conservation and sustainable use – two of the objectives of the Convention – should be regarded as two sides of the same coin. They are prerequisites for each other: long-term conservation depends on our establishing sustainable use, i.e. ensuring that components of biological diversity are used in a way and at a rate that does not lead to the long-term decline of diversity. In parallel with this, it can be said that use – actual and potential – is the most important reason for conserving biodiversity in the long term.

The state of biodiversity in Sweden

Sweden's biodiversity and its current status are described in detail in the Swedish country study. A number of conclusions which can be drawn from that study will be presented shortly. It should be emphasized that the country study describes the *state of biological diversity* in Sweden as it was at the beginning of the 1990s. This state is of course the result of hundreds of years of human influence, both favourable and unfavourable, in addition to the natural conditions prevailing in the country. The study does not reflect the activities and changes that have occurred in the last few years. The effects of these developments can hardly be read off on the short time-scale involved.

- Sweden is naturally poor in species (the total number is estimated at 55,000), owing to the comparatively short time that has elapsed since the last glaciation and because of the country's northerly location. Bryophytes and lichens, however, are relatively species-rich groups in Sweden, even by international standards.
- In general, the average number of species per unit area has decreased – a decline in the diversity of flora and fauna which is attributable to the fact that the agricultural and forest landscapes, in particular, have become more uniform and impoverished in terms of habitats.
- Modern agriculture and forestry are the biggest single causes of losses of biodiversity. In the farmed landscape there has been a substantial decline in the areas of meadow- and pasture-land and wetlands. In the forest landscape the proportion of natural forest, i.e. relatively old forest created by natural regeneration and not affected by recent silvicultural measures, has fallen sharply throughout the 20th century. It is estimated that natural forests now make up only around 4 per cent of Sweden's forest area producing more than 1 cubic meter/year outside protected areas and montane forests. Within the montane forest zone, some 43 per cent of the forest producing 1 cubic meter/year is fully protected. The corresponding figure for forests outside the montane zone (i.e. most of Sweden's forest area) is 0.8 per cent. Forest land protected as nature reserves or national parks is estimated to about 1 430 000 ha corresponding to some 5% of the total forest area of Sweden which is estimated to 28,8 milion hectar.
- In inland waters, action to promote fisheries (stocking) has often done more harm to other components of biodiversity than fisheries themselves.
- Hydroelectric schemes have affected a great many of Sweden's rivers, with highly +detrimental consequences for biodiversity.
- Development for buildings and infrastructure has mostly had local impacts. At the landscape level, however, considerable fragmentation has occurred, although its effects on diversity are poorly understood.

- Acidification has had major effects, particularly on oligotrophic (nutrient-poor) inland waters.
- Eutrophication has occurred in both the marine environment and inland waters.
- Persistent organic pollutants have had a particularly marked effect on top consumers in food webs, such as seals and the white-tailed eagle.
- Generally speaking, we know most about Sweden's biodiversity at the species level, particularly with regard to red-listed species. Nevertheless, more needs to be known, for example, about the habitat requirements of red-listed species.
- In the groups that have been evaluated with regard to threat status, some 3,500 species in Sweden have been placed on the national Red Lists, corresponding to about 7 per cent of all known species in the country.

As regards biodiversity at the ecosystem level, Sweden has a number of unique assets of great conservation interest from an international as well as a national point of view. These include the brackish-water environment of the Baltic Sea, coastal archipelagos, undisturbed wet forests and montane forests (western taiga), warmth-demanding deciduous forests (oak, beech etc.) of a natural character, mires (with their hydrology largely intact), several major rivers not harnessed for hydroelectric power, and, not least, remaining areas of well-managed traditional farmland with considerable species and habitat diversity.

Considered together, the national Red Lists constitute an important basis for assessing the status of biological diversity. They say a great deal not only about the situation at the species and population levels, but also about what has happened and is happening at the habitat and ecosystem levels, since, in general, the commonest threat factor is habitat destruction or an erosion of habitat characteristics that are vitally important to many species. The patterns that emerge from an analysis of the Red Lists, particularly with regard to threat factors and habitat requirements, give a good indication of why the situation is as it is. For example, the lists include some 1,950 of Sweden's forest-dwelling species, and almost as many species associated with the agricultural landscape.

Encouraging developments can also be noted, including favourable trends in the populations of a number of mammals and birds: white-tailed (sea) eagle (*Haliaeetus albicilla*), peregrine falcon (*Falco peregrinus*), otter (*Lutra lutra*), grey seal (*Halichoerus grypus*) and the predatory mammals wolverine (*Gulo gulo*), lynx (*Felis lynx*), brown bear (*Ursus arctos*) and wolf (*Canis lupus*).

Objectives and action to promote biological diversity

In 1991, the Swedish Parliament and Government adopted an overall objective for biodiversity: 'Biological diversity and genetic variation should be safeguarded. Plant and animal communities should be maintained so as to enable viable populations of plant and animal species occurring naturally in Sweden to survive in natural surroundings.'

A corresponding goal was laid down in a forestry policy decision with regard to the biodiversity associated with forests: 'The biological diversity and genetic variation of forests should be safeguarded. Forests should be managed in such a way as to enable

viable populations of plant and animal species occurring naturally there to survive in natural surroundings. Threatened species and habitat types should be protected.'

In conjunction with decisions on agricultural policy, the following objective, among others, has been established: 'The environmental objective of agricultural policy is to safeguard a rich and varied agricultural landscape and its cultural assets, to conserve biological diversity and to minimize the environmental impact of agriculture attributable to nutrient leaching and use of pesticides.'

In environmental policy decisions, goals have also been laid down concerning the introduction of alien species and genetically modified organisms (GMOs).

The Government will be putting a broad-based Environmental Policy Bill before Parliament in 1998. National environmental objectives, including those relating to biodiversity, will be reviewed and to some extent revised and defined more precisely in that context.

On completion of the country study, sectoral action plans were drawn up. This task was delegated to the same authorities as had prepared the country study. On the one hand, the Government commissioned the Environmental Protection Agency to elaborate an action plan containing measures for the conservation and sustainable use of biological diversity; on the other, it requested the following sectoral agencies to draw up corresponding plans from the vantage point of their respective sectors:

Swedish Board of Agriculture	Agriculture, horticulture and reindeer herding
National Board of Forestry	Forestry
National Board of Fisheries	Fisheries and aquaculture
Swedish Board of Housing, Building and Planning	Building and physical planning sector

The five action plans were presented to the Government in the autumn of 1995. In 1997 the Government and Parliament took various decisions confirming these plans. Given the approach adopted by Sweden, a formal national action plan will not be compiled at the Government level. Instead, the five sectoral plans should together be regarded as forming the main core of Sweden's national action plan.

The Swedish International Development Cooperation Agency (Sida) has, instead of an action plan, elaborated guidelines on activities relating to biodiversity and an Action Programme for Sustainable Development.

Like the country study, the action plans were prepared on the basis of broad-based collaboration between sectoral authorities and scientific institutions. An important difference compared with the country study, though, was that each agency was now *individually responsible* for drawing up an action plan *for its own sector*. It was the task and responsibility of each sectoral agency to consider what measures needed to be taken in its sector to minimize the adverse impacts of that sector on biodiversity and to contribute instead to achieving the objectives of the Convention. In the past, the environmental authorities have often defined what measures are required in different sectors. The terms of reference issued by the Government gave the agencies concerned a joint responsibility to ensure the necessary consultation and coordination.

Progress in implementing the various measures proposed in the five action plans is described in more detail in chapter 6.

Broad involvement in implementation

Alongside the action initiated by political decisions and the efforts of government agencies, many other actors, in different economic sectors and within the environmental movement, have contributed in various ways to the early phase of implementation. For example, both the forestry and the agricultural sector are developing and using eco-management systems, including environmental reports, accounts, policies etc. Major forest companies are carrying out their own surveys of sites supporting red-listed species, ecological landscape planning, 'site adaptation' of forestry methods and so on. A relatively new instrument is the Swedish certification standard drawn up on the basis of discussions within the Swedish FSC (Forest Stewardship Council) Working Group between representatives of the larger forest companies, environmental non-governmental organisations, trade unions and the Sami people. In agriculture, farmers and their national organization are running a project in which farmers carry out 'environmental surveys' of their own holdings, including the biodiversity to be found there. The fisheries and reindeer-herding sectors, too, are demonstrating a greater involvement in environmental issues, including biological diversity. The Sami, the indigenous population of northern areas of Scandinavia, for whom reindeer herding, hunting and fishing are traditional livelihoods, are also actively addressing questions relating to the management of natural resources, above all from the standpoint of *Agenda 21*.

The voluntary environmental movement was involved in efforts to conserve biodiversity long before the Convention came into force. The movement plays a major and significant role in opinion-forming and public education, e.g. through campaigns and study circles. It also seeks to influence decision-makers at different levels and to watch over valuable natural areas to ensure that their conservation interest is not destroyed by development or unsuitable land use. Many organizations are also actively involved in and providing an impetus for Local Agenda 21 activities and running tangible species conservation projects. Since the Rio Conference, moreover, Swedish environmental organizations have appreciably stepped up their cooperation with the international environmental movement and local organizations in the South and the East, including on biodiversity issues.

Financial resources

Sweden is seeking to implement the Convention on the basis of integrating biological diversity into the policy areas and sectors concerned. It is extremely difficult therefore to estimate the total sum being devoted by central government to the conservation and sustainable use of biodiversity. The expenditure involved is spread over several government ministries and 'expenditure areas'. What is more, it is often incorporated in larger expenditure items and allocations, for example alongside funding for other environmental measures or more production-related appropriations. The task becomes even more difficult if we attempt to estimate the resources invested in biodiversity by municipal authorities, different economic sectors, non-governmental organizations etc.

A few examples of resources allocated to biodiversity in the *central government budget* are set out below. All the figures relate to the 1997 budget, unless otherwise indicated.

Important allocations for biodiversity within the expenditure area 'General environment and conservation' include:

Framework allocation to Environmental Protection Agency	SEK 355 m.
Environmental monitoring	SEK 94 m
Liming of lakes, rivers and streams	SEK 130 m.
Safeguarding natural areas of conservation value	SEK 217 m.
Research on the environment and low-waste materials cycles	SEK 135 m.
Certain areas of international environmental cooperation	SEK 41 m.

* 66 milion SEK i

Most of the allocation devoted to safeguarding natural areas of conservation value (primarily national parks and nature reserves) benefits biodiversity, although such areas are protected for other reasons, too, such as their recreational or geological interest. The sum shown includes grants from the EU's LIFE fund (an estimated SEK 25 million). Freshwater liming is now carried out primarily with the aim of conserving biological diversity, and the whole of this appropriation must be regarded as benefiting biodiversity.

The other allocations set out above are intended for environmental protection efforts in general, and obviously biodiversity is a major aspect of those activities. The Environmental Protection Agency's framework allocation, for example, pays for the maintenance and management of protected areas (approx. SEK 75 million) and for work relating to threatened species (just under SEK 4 million). The allocation for environmental monitoring funds the monitoring programme in its entirety; it is hardly possible to estimate how large a proportion of this is of relevance to biodiversity. The research allocation is intended for all environmental research, including research relating to low-waste materials cycles ('ecocycles').

Several major items of expenditure relating to biodiversity are to be found in the expenditure area 'Agriculture and forestry, fisheries etc.'. The most significant items include:

- The Swedish agri-environmental programme, set up under the EU's Agri-Environment Regulation. As from 1998, this programme will have a total budget of SEK 2,800 million, of which around SEK 1,290 million will be used to promote biological diversity, chiefly by supporting management of semi-natural grazing lands and meadows.
- Environmental improvement measures in agriculture (SEK 24 million).
- Small-scale habitat protection and nature conservation agreements on forest land (SEK 20 million).
- Damage caused by wild animals (SEK 12.5 million).
- Compensation for reindeer killed by predators (SEK 24 million).
- Fishery conservation measures (SEK 20 million, 1998).

In the field of development cooperation, too, it is difficult to distinguish expenditure specifically intended to promote the conservation and sustainable use of biodiversity. If a broad interpretation is applied, i.e. regarding all of Sweden's bilateral natural resources programmes as having this aim, the sum involved amounts to some 10 per cent of the bilateral aid budget, which in 1997 totalled almost SEK 12 billion, i.e. around SEK 1.2 billion. Of these funds, some SEK 100 million were earmarked for projects specifically concerned with conservation, such as gene banks and nature conservation work.

Monitoring and evaluation

Sweden's environmental monitoring system is divided into a national core programme, managed directly by the Environmental Protection Agency, and regional programmes, managed by county administrative boards within frameworks laid down by the Agency. The focus of the monitoring programme is on monitoring various chemical threats and their effects in the environment. Attention is paid to the effects of agriculture and forestry, tourism and other types of land use, i.e. factors which have very major impacts on biodiversity. Even where large-scale monitoring of biological variables, such as freshwater and marine plankton and benthic fauna, is undertaken, the variables and sampling sites chosen are not optimally geared to indicating trends in biodiversity. In the case of certain habitat types containing high diversity, such as wetlands and mountains, virtually no biodiversity monitoring is being carried out.

It is very important to extend environmental monitoring efforts focusing on biodiversity.

Work is also in progress in Sweden on indicators, assessment criteria and statistics, which are valuable tools in the implementation process and above all in evaluating progress towards objectives. The dominant view is that variables relating to biodiversity should be studied as an integral part of wider efforts to protect and enhance the environment.

Experience and conclusions drawn

The following account describes some of the general lessons learnt from efforts to implement the Convention. Conclusions drawn in the areas covered by the case studies are presented in the case studies concerned.

ÿ The principle of sectoral responsibility is without doubt the right approach. However, a good deal remains to be done before this principle can be said to be operating satisfactorily in the area of biodiversity. Some important points that have emerged:

- It is necessary to *clarify what sectoral responsibility means*, among other things what division of roles and responsibilities it entails.
- It is important that sectoral representatives have an independent responsibility. Forums for dialogue between the environmental protection authorities and the various sectors need to be developed. A shared perception of the existing situation among different actors is crucial to success.

- Interaction between sectoral authorities and the private players in the sectors concerned needs to be developed and strengthened. A ‘sector’ is not necessarily the same thing as its sectoral agency (if any).
- There is a danger of losing sight of cross-sectoral issues if a sectoral division of responsibilities is pursued too far. Such issues must also receive adequate attention.

ÿ It is very important to *define more precisely the concept of sustainable use of biological resources*. This can most appropriately be done within each sector or industry. *Criteria* of sustainable use should be established and monitorable objectives relating to these criteria defined. The next step is then of course to translate these objectives into tangible action programmes with the aim of changing the sector concerned in the direction of more sustainable use. The Swedish standard for forest certification can be regarded as a good example of an attempt to define criteria for sustainable forestry. The criteria which it lays down flesh out the concept of sustainable use in such a way that it can be applied directly in forest management.

ÿ Politically determined objectives placed on an equal footing are important in achieving further progress in sectors and at lower geographical levels (e.g. counties and municipalities). It is *essential to establish monitorable objectives* if the results of the action taken are to be monitored and evaluated. When elaborating objectives, it is often necessary to generalize; a goal may for example express a minimum or maximum level which a parameter must not fall below or exceed, or an average value which should apply over the country as a whole, but with scope for local and regional deviations. Things immediately become more difficult when objectives are to be developed concerning the general state of the countryside, such as fragmentation of the landscape or the distance between and size of habitats. The sectors concerned still have a long way to go in terms of adopting sectoral objectives referring to important parameters relating to their activities. A fundamental requirement is that the actors affected by such objectives – the people who have to help achieve them – also feel a sense of *involvement* in them.

ÿ ‘Biological diversity’ is *often regarded as a difficult concept to understand*. It is of value as an umbrella term for what, at a simplified level, can be called the variety and variability of all living things on earth. Although the phenomena included in the concept – species, genes, ecosystems etc. – are very tangible, the concept *as such* is hardly very tangible. It has many facets; different actors sometimes attach differing meanings to it. There is an urgent need to operationalize this concept. ‘Biodiversity’ must be made capable of being handled in a process involving objectives, action and monitoring of progress. This can only be achieved to a certain extent at a central level. Much of the work has to be done at the regional and local levels and in different sectors.

ÿ Preliminary evaluations of *Local Agenda 21 projects* show that *biological diversity has in general received little attention in this context* in Sweden. There are no doubt several reasons for this. A Local Agenda 21 process is supposed to grow mainly ‘from below’. There appears to be a gap between national undertakings in this area (the Convention, environmental policy objectives and so on) and the everyday lives of ordinary people. It is necessary to demonstrate how the conservation of biodiversity does in fact affect the individual and – not least – how the individual can help to

conserve biodiversity. It may be important in this context to emphasize that biodiversity has many different values, not only economic and scientific, but also social, cultural, recreational and aesthetic. It should also be pointed out that efforts to maintain biodiversity are prompted not only by the individual's needs, but also by ethical considerations: questions concerning the global distribution of resources, solidarity with future generations, and ultimately ethical/moral obligations to other forms of life here on earth. Many people are committed to safeguarding nature perhaps not primarily out of an intellectual conviction about the importance of conserving biodiversity, but rather because of a deep-seated feeling for nature and all living things. This commitment needs to be turned to better account in national efforts to implement the Convention.

ÿ We are faced with a major and important *educational challenge*; in short, the challenge of public education. Just as we need to explain and describe what an ecologically sustainable society is all about, so too we must explain what biological diversity is and how it affects us all. This task is not one which central government and other authorities can undertake on their own; a wide range of different groups in society must also be involved. Sweden has a strong tradition of voluntary sector activities and adult education on which to build. Now this tradition must be channelled into addressing the major issues of the 21st century: the common task of building an ecologically sustainable society and, as part of this: why and how we should conserve biodiversity.

ÿ *Continuing regional and international cooperation* is necessary to solve many of the problems which Sweden faces at a national level in terms of maintaining biological diversity. This is particularly true as regards pollution problems, migratory populations, and the situation in the Baltic, the world's largest brackish-water sea. International cooperation is also of the greatest importance in making it possible to change Swedish consumption and production patterns so as to minimize their adverse impacts on biodiversity in other parts of the world.

ÿ The Convention has without doubt had a *catalytic effect* on the work being done in Sweden. Many initiatives and projects have seen the light of day thanks to the Convention and the attention which it has drawn to biodiversity. It is presumably as a catalyst for processes at the regional, national and local levels that the Convention has its greatest strength. The Convention has brought a number of at least partly new dimensions to nature conservation efforts: Genetic variability is receiving more adequate attention than before. The link between *in situ* and *ex situ* conservation has been recognized. The linking of use and conservation has lent greater breadth to nature conservation work; traditional nature conservation is now even more clearly linked to conservation and sustainable use of resources. A new impetus has been given to efforts to address the problems associated with alien species. Discussion about the significance of biodiversity for the functioning of ecosystems has gathered momentum. And conservation and sustainable use of biodiversity are playing a more prominent role in development cooperation.

Despite substantial and wide-ranging efforts, a great deal obviously remains to be done. Although there are some encouraging signs, major and in some cases difficult areas of action still have to be tackled. Of these, particular mention may be made of:

- Protection of areas of particularly great value in terms of biodiversity, especially Sweden's natural forests.

- Improving the status of red-listed species, to ensure the long-term survival of viable populations.

- An expansion of environmental monitoring to take better account of needs in the area of biodiversity.

- Further development of knowledge: by means of inventories, we need to find out what biological diversity exists in the country, not least in aquatic environments.

- Further development of methods to ensure long-term sustainable use of biodiversity in fisheries, agriculture, reindeer herding and forestry.

- Development of regional and international cooperation.

Naturally, it is not possible to single out a small number of universal measures which will save Sweden's biodiversity. Only by a combination of a wide variety of efforts – sometimes on a small scale, sometimes on a larger scale – can we establish a basis for maintaining our wealth of diversity of genes, species and ecosystems. What is needed is a diversity of measures and projects and, above all: a diversity of actors, each playing their part.

1. Introduction

The Convention on Biological Diversity in brief

The United Nations Convention on Biological Diversity was signed in Rio de Janeiro in June 1992. The Convention entered into force in December 1993.

One hundred and sixty-nine states, including the European Union, have subsequently ratified the Convention (June 1997), making it one of the most widely supported international agreements ever. With its broad approach, the Convention has the potential to play a coordinating and leading role in international nature conservation efforts.

The Convention has three overall objectives:
- the conservation of biological diversity,
- the sustainable use of its components, and
- the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The Convention deals with both conservation and use. The third of the objectives mentioned is concerned in particular with the relationship between countries providing genetic resources and those which use technology and knowledge to develop products from these resources and thus create value added.

The Convention is broad in scope, encompassing both 'wild' and domesticated biodiversity. It includes provisions on the use of biological resources and on genetically modified organisms (GMOs). The Convention can be said to span all aspects of life on earth, i.e. the biosphere. Its principal strength probably lies in the role which it is playing, and will continue to play, as a catalyst of national, regional and local processes. The structure of the Convention is sufficiently flexible to allow each country to design its own policies in this area and to discharge its obligations – i.e. implement the Convention – in the light of its own national situation.

The Convention contains articles and provisions which entail national undertakings in many different areas. The more important of these undertakings include:
- to develop national strategies, plans or programmes for biological diversity,
- to integrate and involve relevant sectors in work relating to these strategies etc.,
- to identify and monitor biodiversity,
- to promote *in situ* conservation, e.g. by establishing protected areas,
- to promote *ex situ* conservation, e.g. in gene banks,
- to develop methods for sustainable use of biological resources,
- to adopt incentive measures,
- to promote research, training and public awareness,
- to promote environmental impact assessments and minimize adverse impacts,
- to facilitate access to and transfers of relevant technology and genetic resources,
- to promote international technical and scientific cooperation, and,
- in the case of developed countries, to provide financial resources to assist developing countries in implementing the Convention.

Sustainable use is a key concept in the Convention. It is defined as 'the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations' (Article 2). In addition, the Convention affirms the right of every country to determine how its own genetic resources are to be used. It also includes recommendations on financial support for implementation by the developing countries.

The Conference of the Parties is the highest decision-making body under the Convention. At the time of writing (autumn 1997), it has held three meetings (1994, 1995 and 1996).

National reporting

Under Article 26 of the Convention, each contracting party is required, at intervals to be determined by the Conference of the Parties, to present to the Conference of the Parties reports on measures which it has taken to implement the provisions of the Convention and on their effectiveness in meeting the Convention's objectives. According to a decision taken at the second meeting of the Conference of the Parties (Decision II/17), the first national reports are to be presented at the fourth meeting of that body (in May 1998). These reports are to be submitted to the Convention Secretariat at the beginning of 1998.

According to Decision II/17, the reports to the fourth meeting of the Conference of the Parties are to focus on:

- the implementation of Article 6, 'General Measures for Conservation and Sustainable Use' and
- the information available in national country studies.

An annex to the decision provides guidelines on the arrangement and content of the national reports.

Pursuant to Article 26, and guided by the decision of the second meeting of the Conference of the Parties, Sweden has prepared the present report. We have endeavoured to adhere by and large to the structure set out in the annex to Decision II/17. The main bulk of this report has been drafted by the Swedish Environmental Protection Agency. The Swedish International Development Cooperation Agency (Sida) has contributed material on biodiversity-related development assistance activities, and a number of other authorities and institutions have provided drafts of particular sections of the report.

Sweden's biodiversity strategy, country study and sectoral action plans (see chapters 3–5 for further details) are important background documents. The following are therefore attached as annexes to this report:

- *Strategy for Biological Diversity* (Government of Sweden),
- *Biological Diversity in Sweden – A Country Study* (Swedish Environmental Protection Agency),
- *Action Plan on Biological Diversity* (Swedish Environmental Protection Agency),
- *Action Plan on Marine Biodiversity* (Swedish Environmental Protection Agency),

- *Action Plan for Biological Diversity and Sustainable Forestry* (Swedish National Board of Forestry),
- *Biodiversity in Sweden – Conservation and Sustainable Use of Biodiversity in the Agricultural Landscape in Sweden* (Swedish Board of Agriculture).

These documents are to be regarded as part of Sweden's report under the Convention. In the case of the action plans of the Swedish National Board of Fisheries, the Swedish Board of Housing, Building and Planning, and the Swedish Board of Agriculture (see 4.2), English summaries are not available.

This report includes only brief summaries of the above documents, to avoid unnecessary overlap.

2. National background data

This chapter contains certain background data which may be relevant to an understanding of Sweden's biodiversity and the implementation of the Convention in Sweden. A detailed account of the country's biological diversity, the threats facing it, how biological resources are used etc. has been provided in Sweden's country study (*Biological Diversity in Sweden – A Country Study*, 1994). A brief summary of that study is given in 2.4.

2.1 Basic data on Sweden

Sweden has a temperate climate, as a result of the large amounts of heat carried north through the Atlantic by the Gulf Stream. The country has an area of 450,000 square kilometres and is elongated in shape in a north–south direction. Its northernmost areas lie to the north of the Arctic Circle.

Sweden's ecosystems vary from oak, beech and other deciduous woodlands in the south to areas of tundra in the north. An extensive belt of boreal coniferous forest covers a large proportion of the country. Around 12 per cent of its area consists of mires of various types. Most of Sweden is relatively flat, but in the west, along the border with Norway, is the Scandinavian mountain range, with its alpine ecosystems. The highest peaks reach altitudes of over 2,000 m. Sweden has more than 83,000 lakes, and the total area of lakes, rivers and streams is 29,400 sq km. The country has a long coastline, extending for roughly 7,000 km. Off the west coast are the Skagerrak and Kattegat, which form part of the North Sea. To the south and east lies the Baltic Sea, the world's largest semi-enclosed brackish-water sea. There are several large archipelago areas.

Forests cover 62 per cent of the country (280,000 sq km), with productive forest land accounting for 229,000 sq km. The dominant tree species are Norway spruce (*Picea abies*), Scots pine (*Pinus sylvestris*) and birches (*Betula* spp.). Natural/virgin forest makes up only a few per cent of the productive forest area. Forests are one of Sweden's most important natural resources, and the country has a long tradition of forestry. Historically, forestry and the forest products industry, together with iron and steel, have formed the backbone of the Swedish economy. Directly or indirectly, the forest sector employs almost 200,000 people. Fifty per cent of forest land is in the hands of 350,000 private owners, 40 per cent belongs to limited companies and 10 per cent is publicly owned (by the state and municipal and county councils).

In employment terms, the agricultural sector has contracted very significantly in the last 50 years, and now occupies only around 90,000 people, or 1 per cent of the population. Of this total, only approximately 36,000 work full-time in farming. There are some 87,300 agricultural enterprises, and around 2.8 million ha of arable land, which is about 6 per cent of Sweden's land surface. In addition, there are roughly 440,000 ha of non-arable grazing land. Some 42 per cent of agricultural enterprises are devoted mainly to livestock production and 14 per cent to crop growing, while 8 per cent are mixed farms. In forest areas, farms often combine agriculture with forestry. The majority of farm enterprises are family-run.

Sweden has many rivers and streams. During the industrialization of the country, a large proportion of its major rivers were harnessed for hydroelectric power, to supply electricity to a growing industrial sector and subsequently also to meet demand from domestic users.

The shallow sea areas around Scandinavia are among the most productive and contain some of the richest fish stocks in the world. The Swedish fishing fleet now operates primarily in the Skagerrak, the Kattegat and the Baltic Sea, within a few hundred kilometres of the Swedish coast. The number of people employed in fishing has shown a steady decline in recent decades and now totals barely 3,000, with a few hundred more who fish part-time.

The right to herd reindeer in Sweden is reserved to the Sami, an indigenous people inhabiting Fennoscandia and parts of Russia. Reindeer-herding areas cover some 40 per cent of Sweden's land surface, and are concentrated in northern parts of the country. Reindeer herding, which is carried on within a structure of 51 reindeer husbandry districts (*samebyar*, incorporated associations with economic and administrative functions), is an extensive activity dependent on large areas of pasture.

On 31 December 1996, Sweden had a population of just over 8.8 million. Up to 1820, when the figure was 1.4 million, population growth was slow. Industrialization was accompanied by a more rapid rate of increase. Compared with other OECD countries, Sweden has a low population density, with an average of 19 inhabitants per square kilometre. Some 85 per cent of the population live in cities, towns and other settlements with 200 or more inhabitants, above all in southern areas of the country.

On 1 January 1995, Sweden became a member state of the European Union (EU).

2.2 Institutional structures

Within the Swedish Government, the Ministry of the Environment is responsible for coordinating biodiversity issues, including the Convention on Biological Diversity. Several other government departments, in particular the Ministry of Agriculture, the Ministry of Industry and Commerce and the Ministry for Foreign Affairs, are responsible for implementing the Convention in their respective spheres of activity. There are also a large number of central government agencies, which are subordinate to the various ministries. In the environmental sphere, the Environmental Protection Agency has the role of coordinating and giving a lead in efforts to promote biodiversity. Other important central government agencies in this context are the Swedish Board of Agriculture, the National Board of Fisheries, the National Board of Forestry, the Swedish Board of Housing, Building and Planning, and the Swedish International Development Cooperation Agency (Sida) (see chapter 3).

Administratively, Sweden is divided into 21 counties (*län*) (as from 1 January 1998) and 286 municipalities (*kommuner*). In each county there is a county administrative board, which is responsible for environmental protection within the county. Like the Environmental Protection Agency at the national level, county administrative boards have the role of coordinating and lending an impetus to action at the regional level.

They are also responsible for agricultural, fisheries and regional policy issues. They report directly to the Government. At the regional level there are also 11 county forestry boards under the National Board of Forestry (together forming the Forestry Administration), with substantial responsibility for biodiversity in relation to the forestry sector. Municipalities enjoy a high degree of self-government, having independent powers of taxation, for example. Every municipal authority has some form of council committee and an associated administrative department responsible for environmental matters (including biodiversity). A significant number of municipalities (around 100) have appointed municipal ecologists or similar officers to deal with issues relating to biological diversity.

Other important institutions include universities and university colleges. There are biology departments at some ten higher education establishments. The Swedish University of Agricultural Sciences conducts research into biodiversity and, to a certain extent, sustainable use. The Swedish Threatened Species Unit, which compiles national Red Lists of threatened plants and animals, is a body sponsored jointly by the Environmental Protection Agency and the University of Agricultural Sciences. Its function is to gather, store and evaluate information about species and to produce national Red Lists. In addition, it is expected to play a part in ensuring that information about red-listed species and their distributions is made available and brought to the attention of decision-makers and those who, through their decisions and actions, influence the habitats of the species concerned.

The Swedish Museum of Natural History in Stockholm and other natural history museums play an important role in efforts to safeguard biodiversity. They often have special expertise and resources in the areas of systematics and taxonomy, research and, not least, public information activities relating to biological diversity. The Swedish Museum of Natural History also has a wide range of international contacts, including cooperation with museums in developing countries.

In the field of *ex situ* conservation, a joint Nordic institution (the Nordic Gene Bank) serves as a regional centre for the conservation and use of plant genetic resources. Its mandate encompasses agricultural and horticultural crops, including fruits. It is based in Sweden (Alnarp). In Ås in Norway there is a corresponding Nordic institution responsible for domesticated animals. At the National Board of Fisheries' research station at Kälarne, work is in progress on a living gene bank and cryo-preservation relating to fish. There are also a number of private gene banks, operated above all by commercial breeders.

In addition, a number of zoos are involved in *ex situ* conservation efforts which have the ultimate aim of strengthening more or less threatened populations *in situ*. The Swedish Association of Zoos and Aquaria, with a membership comprising 19 collections across the country, is running nine different conservation projects. These include controlled breeding and the maintenance of studbooks. There are also a number of voluntary organizations which are seeking to conserve Sweden's various landraces (indigenous breeds) of livestock. They are actively involved in a range of practical and successful conservation projects, as well as disseminating information about endangered breeds. Certain open-air museums, too, are playing an important role in conservation and information efforts relating to landraces of livestock and crop

species. At the central government level, the Swedish Board of Agriculture is responsible for the conservation of domesticated biodiversity (landraces). Attached to the Board is a Gene Banks Committee for Domesticated Animals.

Shortly after ratifying the Convention, the Government established a Scientific Council on Biological Diversity. Its function is to advise the Swedish Government, both with regard to the positions to be adopted by Sweden within the Convention and its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), and concerning national implementation. The Council, through its secretary, is linked administratively to the Environmental Protection Agency.

A Swedish Biodiversity Centre has also been set up as a consequence of Sweden becoming a party to the Convention. Based in Uppsala, it is attached to the Swedish University of Agricultural Sciences and Uppsala University. The Centre's role is to coordinate and encourage research on biological diversity, provide education and training, and help to make the results of research available to users. It also arranges in-service training courses and seminars and disseminates information.

There are in addition a number of voluntary organizations in Sweden which are actively concerned with biodiversity issues, engaging in both opinion-forming and lobbying activities and tangible projects. The largest organizations are the Swedish Society for the Conservation of Nature, WWF Sweden, the Swedish Ornithological Society, Greenpeace and Friends of the Earth Sweden. Mention should also be made of hunters', farmers' and anglers' organizations. Furthermore, there are a range of specialized organizations working in areas such as botany, bryophytes, fungi, predatory mammals and conservation of indigenous livestock breeds and crop varieties. These organizations were involved in efforts to promote the conservation and sustainable use of biodiversity long before the Convention came into force.

2.3 Biodiversity-related legislation

The piece of legislation that has been of most importance in terms of conserving biodiversity is the Nature Conservation Act. It provides for the protection and management of areas of particular value, in the form of national parks, nature reserves and so on. It also contains general provisions on shore protection, general protection of certain small-scale habitat types, and land drainage, all with the aim of maintaining biological diversity.

The Environment Protection Act has the purpose of protecting the environment from pollution and similar forms of disturbance, chiefly arising from stationary installations. The Natural Resources Act is an overarching law which requires different interests to be weighed up when decisions are taken concerning land and water use. It also includes provisions which give certain rivers and stretches of rivers effective protection from development for hydroelectric schemes.

In addition, the statutes regulating the various primary sectors (the Forestry Act, the Act on the Management of Agricultural Land, fisheries legislation and the Reindeer Husbandry Act) are relevant to biodiversity because of their provisions on environmental impact assessments and due attention to nature conservation in the

sectors concerned. Other enactments include legislation on genetically modified organisms, corresponding to the EU legislation in this area, and a relatively new law dealing specifically with trade in endangered species of wild fauna and flora.

The majority of this legislation, together with a number of other environmental laws, is currently being amalgamated into a single Environmental Code. The aim is to create a coherent body of legislation in the environmental sphere. It is intended that the new Code will come into force in the course of 1999 (see chapter 6 for further details).

The Swedish Constitution contains provisions regulating the entitlement of landowners to compensation if decisions by the state restrict their right to make normal use of their land. These compensation rules mean, for example, that protection of forest land from forestry activities which is of value in terms of biodiversity and forestry can involve considerable costs for the state.

2.4 *Biological Diversity in Sweden* – a summary of the country study

In 1994 Sweden published a report on the state of biodiversity in the country: *Biological Diversity in Sweden – A Country Study* (Swedish Environmental Protection Agency, Monitor 14). The study was compiled in close consultation with the Swedish Board of Housing, Building and Planning, the National Board of Fisheries, the Swedish Board of Agriculture, the National Board of Forestry, the Swedish University of Agricultural Sciences, the Swedish Threatened Species Unit and the Nordic Gene Bank (see 4.1 for further details).

The following is just a brief summary of the main conclusions of the study. Readers wishing to find out more about Sweden's biodiversity are referred to the country study itself.

Threats to biological diversity

The biodiversity of Sweden has been affected both by land and water use and by pollution. The threats posed by these two types of factors are not directly comparable. In the terrestrial environment, the losses of biodiversity that have occurred up to now can primarily be attributed to land use, especially urban expansion, agriculture and forestry, and to the changes that have occurred in these sectors, particularly during the second half of the 20th century. Pollution has hitherto had its greatest impact on aquatic environments, both freshwater and marine. The two most important forms of pollution adversely affecting biodiversity can be said to be acidification and eutrophication.

A number of conclusions which can be drawn on the basis of the country study are set out below. It should be emphasized that the study describes Sweden's biological diversity as it has developed as a result of hundreds of years of human influence, both favourable and unfavourable. It does not reflect the activities and changes that have occurred in the last few years.

- Sweden is naturally poor in species (the total number is estimated at 55,000), owing to the comparatively short time that has elapsed since the last glaciation and because of the country's northerly location. Bryophytes and lichens, however, are relatively species-rich groups in Sweden, even by international standards.
- In general, the average number of species per unit area has decreased – a decline in the diversity of flora and fauna which is attributable to the fact that the agricultural and forest landscapes, in particular, have become more uniform and impoverished in terms of habitats.
- Modern agriculture and forestry are the biggest single causes of losses of biodiversity. In the farmed landscape there has been a substantial decline in the areas of meadow- and pasture-land and wetlands. In the forest landscape the proportion of natural forest, i.e. relatively old forest created by natural regeneration and not affected by recent silvicultural measures, has fallen sharply throughout the 20th century. It is estimated that natural forests now make up only around 4 per cent of Sweden's forests producing more than 1 cubic meter/year outside protected areas and montane forests. Within the montane forest zone, some 43 per cent of such forest is fully protected. The corresponding figure for forests outside the montane zone (i.e. most of Sweden's forest area) is 0.8 per cent.
- In inland waters, action to promote fisheries (stocking) has often done more harm to other components of biodiversity than fisheries themselves.
- Hydroelectric schemes have affected a great many of Sweden's rivers, with highly detrimental consequences for biodiversity.
- Development for buildings and infrastructure has mostly had local impacts. At the landscape level, however, considerable fragmentation has occurred, although its effects on diversity are poorly understood.
- Acidification has had major effects, particularly on oligotrophic (nutrient-poor) inland waters.
- Eutrophication has occurred in both the marine environment and inland waters.
- Persistent organic pollutants have had a particularly marked effect on top consumers in food webs, such as seals and the white-tailed eagle.
- Generally speaking, we know most about Sweden's biodiversity at the species level, particularly with regard to red-listed species. Nevertheless, more needs to be known, for example, about the habitat requirements of red-listed species.
- In the groups that have been evaluated with regard to threat status, some 3,500 species in Sweden have been placed on the national Red Lists, corresponding to about 7 per cent of all known species in the country.

As regards biodiversity at the ecosystem level, Sweden has a number of assets of great conservation interest from an international (chiefly a European) point of view:

- the brackish-water environment of the Baltic Sea, including coastal archipelagos,
- undisturbed wet forests and montane forests (western taiga),
- warmth-demanding deciduous forests (oak, beech etc.) of a natural character,
- mires (with their hydrology largely intact),
- several major rivers not harnessed for hydroelectric power,
- remaining areas of well-managed traditional farmland with considerable species and habitat diversity, and
- shallow sea inlets and bays on the west coast.

In general, more research needs to be conducted in the following areas, among others:

- genetic variation within species and populations, and the existence of genetically distinct populations in Sweden,
- the dispersal biology of different species and groups of organisms,
- invertebrates and other lower groups of organisms,
- marine biodiversity,
- the effects of reindeer grazing in the mountain environment,
- the long-term effects of pollution on biodiversity, and
- the significance of biodiversity for the functioning of ecosystems.

Encouraging trends, too

Although Sweden has many nationally red-listed species and losses of biodiversity are still a major problem, encouraging trends and results can also be noted, particularly with regard to a number of mammal and bird species. The following are a few examples.

The Swedish population of the *white-tailed (sea) eagle* (*Haliaeetus albicilla*) has trebled since the beginning of the 1970s, and the coastal population now numbers around 150 pairs. In inland areas of northern Sweden there are another approximately 50 pairs. The increase is largely the result of a wide range of measures undertaken by the Swedish Society for the Conservation of Nature (a voluntary environmental organization), with support from the Environmental Protection Agency. These measures have included winter feeding using meat uncontaminated with toxic substances, resulting in greatly improved juvenile survival rates, and protection of nesting sites from tree felling and other disturbance. The slow recovery is continuing and the white-tailed eagle is gradually reclaiming its former territories.

The *peregrine falcon* (*Falco peregrinus*) was severely affected by persistent pollutants in the 1950s and 1960s, and in the mid-1970s its Swedish population reached an all-time low of 15 breeding pairs. To save the species, the Society for the Conservation of Nature established a captive breeding project. Eggs were collected from nests in the wild, hatched in incubators and the young birds released. Birds in captivity were bred and their offspring subsequently released. These measures probably prevented the complete disappearance of the species from southern Sweden, and the population is now growing steadily without assistance.

Several other species which had been declining are now increasing in numbers. The *otter* (*Lutra lutra*) is one example of a species which suffered heavy hunting pressure in the early and middle decades of the century and which has probably also suffered reproductive disturbances as a result of high levels of persistent pollutants. A ban on hunting and lower pollutant levels have gradually produced results, and the otter, too, has slowly begun to return to old hunting grounds. Acidification and development of rivers, however, mean that not all former otter waters are now suitable for the species.

Grey seal (*Halichoerus grypus*) numbers are also rising, probably for the same reasons as in the case of the otter, i.e. protection and reduced loads of persistent pollutants.

Favourable trends can be observed for several of Sweden’s large predatory mammals, too. The position of the *wolverine* (*Gulo gulo*) is still uncertain, but this species may possibly have become slightly more abundant in recent years. However, it is difficult to

say whether the results recorded are due to a real increase or simply to better inventory methods. The *lynx* (*Felis lynx*) population has increased, but in this case too it is unclear by how much, since previously no surveys had been carried out. Cautious licensing of *brown bear* (*Ursus arctos*) hunting has enabled the species to expand in southern parts of its distribution range. The *wolf* (*Canis lupus*) population, too, has grown, but it is still at a very low level. The new system of compensation for reindeer killed by predators that has now been introduced may already have helped to strengthen the position of these predatory mammals.

The action taken has thus benefited several species whose decline was due to persistent pollutants, hunting or persecution. However, for the majority of species which have declined as a result of land use, in the shape of modern forestry and agriculture (particularly when these activities lead to habitat destruction), trends remain unfavourable. To ensure the survival of the white-backed woodpecker (*Dendrocopos leucotos*), for example, which is on the verge of extinction in Sweden, a wide range of measures will be required (see case study).

3. Swedish policy on biodiversity

3.1 The Strategy for Biological Diversity

In the autumn of 1993, the Government presented a Bill entitled *Strategy for Biological Diversity*. This was subsequently approved by Parliament and thus constitutes a political platform and strategy for the promotion of biodiversity in Sweden. The *Strategy* lays down broad principles for the conservation of biological diversity and the sustainable use of biological resources. It was supplemented with a number of broad policy positions set out in a Government Bill presented in the spring of 1997.

In the proposals for a coherent body of environmental legislation (Environmental Code), the conservation of biodiversity is defined as one of the overall objectives of the Code and one of several basic criteria of sustainable development.

Guiding principles in Sweden's biodiversity strategy

The *Strategy* sets out a number of basic assumptions and guidelines for subsequent efforts to implement the Convention in Sweden, including the following:

- Environmental objectives must be accorded the same weight and importance as economic considerations, in order to ensure an ecologically sound basis for human activities. This is reflected *inter alia* in the forestry policy decision taken in 1993, which establishes that, in forestry, production and environmental objectives are to carry equal weight.

- Action to maintain ecological processes and to safeguard the long-term survival of species should be holistic in its approach. The *Strategy* is underpinned by an awareness that the conservation of biodiversity is essential to the long-term productivity of ecosystems.

- Further substantial efforts need to be made to ensure greater environmental sustainability in agriculture, forestry, fisheries and reindeer herding, and to reduce the detrimental effects of pollution and development of land and water (habitat destruction). At the same time, it is necessary to increase further the area of protected land, not least in the forest landscape.

- In practical efforts to maintain biological diversity, the emphasis should be on the ecosystem level and on different habitat types and landscapes. Measures at the species and genetic levels are also necessary, however. At the species level, the main focus should be on the habitats of the species concerned.

- For practical reasons, the aim of safeguarding genetic variability must be equated with that of conserving viable populations of the species in question in their natural ranges.

- National Red Lists of species are important primarily because red-listed species serve as indicators of the overall situation in different ecosystems and within groups of organisms.

- Discussions about priorities which look beyond the country's borders – for example, when the entire range of a particular species is taken into account – *must not* result in Sweden relinquishing its responsibility for habitats, species or genetic variation which undeniably form part of the country's biological diversity.

- Every county and municipality should ponder what its share of the responsibility for maintaining biodiversity entails. If Sweden's obligations under the Convention are to be successfully discharged, implementation must to a large extent take place at the local level.

The *Strategy* deals with the importance of biological diversity, both at the level of genetic variation and at the species and ecosystem levels. Other questions considered are the economic valuation of biodiversity and the present situation and trends regarding biodiversity in Sweden. An issue highlighted as being of key concern is the relationship between biodiversity conservation and different economic activities. The *Strategy* underlines the need to combine measures to improve the environmental performance of different sectors with continuing protection of valuable natural areas.

Conservation and sustainable use mutually dependent

Conservation and sustainable use – two of the objectives of the Convention – should be regarded as two sides of the same coin. They are prerequisites for each other: long-term conservation depends on our establishing sustainable use, i.e. ensuring that components of biological diversity are used in a way and at a rate that does not lead to the long-term decline of diversity. In parallel with this, it can be said that use – actual and potential – is the most important reason for conserving biodiversity in the long term ('Why conserve it if we can't use it?'). Conservation and sustainable use should together result in biological diversity being maintained over time, as a dynamic rather than a static phenomenon – something which does and should change.

Consequently, biodiversity and sustainable use have also been taken into account in policy decisions on forestry, agriculture and fisheries.

Efforts to promote biodiversity are based on interacting and complementary measures at different levels.

The three levels of action proposed in the *Strategy for Biological Diversity*:

1. The ‘ordinary’ landscape: Due attention to the environment in connection with the use of land and water, and environmentally sounder methods of farming, forestry etc. (fundamental level, important in the long term).

2. Areas incorporating natural assets of greater value: Special action is needed to conserve species and to maintain ecosystem functions and processes.

3. Areas of particular value: Covers habitat types and species which, owing to their sensitivity, can withstand very little or no human disturbance or will only survive given a certain type of land management.

Sectoral responsibility and the question of who does what

Since the end of the 1980s, sectoral responsibility has been a cornerstone of Swedish environmental policy. It means that every sector – or actor – has a responsibility to ensure that its (or his or her) own activities are environmentally sustainable. In the area of biodiversity, this primarily means ensuring that the sector’s activities do not cause any loss of biological diversity, but instead help to maintain it. Involving relevant sectors in efforts to promote the conservation and sustainable use of biodiversity is also, under the terms of Article 6, a cornerstone of the Convention.

One section of the *Strategy* attempts to develop and define more precisely how sectoral responsibility is to be applied in the area of biodiversity. The obligation resting on individual sectors or actors to play a part in making their activities ecologically more sustainable, with a view to achieving the environmental objectives that have been set, is identified as the main core of this responsibility. According to the *Strategy*, the role of *sectoral authorities* in the promotion of biodiversity can be summed up as being

- to initiate projects and other measures,
- to draw up sectoral plans to implement the measures required,
- to work alongside the sector itself in implementing measures and monitoring the results,
- to publish regular environmental reports, and
- to disseminate information within the sector about necessary measures and objectives, e.g. by means of education and training.

The principal functions of the *environmental authorities*, primarily the Environmental Protection Agency and the county administrative boards, are

- to define broader objectives,
- to evaluate activities in individual sectors,
- to protect and manage areas of particular value,
- to purchase environmental services, such as continued active management of valuable farmland, and
- to serve as a driving force in environmental protection.

An ongoing *dialogue* between environmental and sectoral agencies and representatives of different sectors is underlined as being crucial to nature conservation efforts. A corresponding dialogue should be maintained at the county and municipal levels.

The *Strategy* makes it clear that sectors are expected to foot the bill for any damage to the natural environment caused by their activities. This also applies to the cost of conserving biodiversity. In the case of primary activities, regional adaptation and differentiation of the methods employed – according to the type of land involved – are important in ensuring that these sectors take better account of the needs of nature conservation. Any costs associated with this process of adjustment can thus be built into the activities concerned.

Emphasis is laid on the importance of biodiversity conservation in sectors such as forestry, agriculture, reindeer herding and fisheries. The great majority of Sweden's surface area consists of 'ordinary' countryside managed for productive purposes, and will continue to do so in the years to come. Areas of this type are consequently of fundamental importance in the conservation of biodiversity. The *Strategy* underscores the need for a continued effort to define goals, preferably measurable goals, for nature conservation, and also to disseminate information.

Other areas covered in the *Strategy* include the handling of genetically modified organisms and alien species, environmental impact assessment, and international follow-up of the Convention on Biological Diversity. Protected areas, provisions on land drainage and small-scale habitat protection, and planning and safeguarding of urban biodiversity are dealt with in separate action-oriented sections of the document. One chapter is devoted to agriculture and related issues, including the farmed landscape, pollution control and conservation of genetic resources. One of the tangible measures proposed is the preparation of special conservation plans for all of Sweden's indigenous crop varieties and breeds of domesticated animals.

The *Strategy* includes an account of the new basic conditions – created by the Convention on Biological Diversity – governing Swedish support for the efforts of developing countries to conserve and ensure the sustainable use of biodiversity.

3.2 Swedish action at the international level

International development cooperation

In 1993 the Swedish Parliament approved the Government's *Strategy for Biological Diversity*. This Bill was accompanied by a separate communication concerning biodiversity and development assistance, in which the Government noted that the Convention changed the basic conditions for international development cooperation and created new opportunities in this field. In view of the importance and far-reaching implications of the question, the Government recommended that a special inquiry be set up on the subject.

Also in 1993, Parliament approved the Government's strategy on national action and global cooperation to achieve sustainable development, which was set out in a Bill

entitled ‘Towards sustainable development: Implementing the decisions of the United Nations Conference on Environment and Development (UNCED)’.

In May 1994, the Government appointed a working group to propose principles, guidelines and methods for integrating the UNCED decisions into Sweden’s development cooperation programme. In this connection, the Government took particular account of the recommendation made in the *Strategy for Biological Diversity*. In November 1994 the working group presented a report entitled ‘Sustainable aid – Swedish development assistance after UNCED’.

With regard to biodiversity, this report – which covered the entire process of follow-up of UNCED – put particular emphasis on the importance of Sweden continuing to play an active part in developing international standards and in providing support for capacity- and institution-building in developing countries and for local projects, *inter alia* through funding for non-governmental organizations.

In its funding document for the 1995/96 financial year, the new aid agency Sida (the Swedish International Development Cooperation Agency) was requested to report by 1 January 1996 on the changes in the direction of greater support for sustainable development that had resulted from the working group’s recommendations. Sida submitted its conclusions on this subject to the Government in the form of an Action Programme for Sustainable Development.

On the basis of the recommendations of the working group and Sida’s own Action Programme, the Government presented a communication to Parliament in autumn 1996 entitled ‘Sweden’s international cooperation to achieve sustainable development’, describing the action taken to follow up UNCED and the guidelines developed since then.

In line with a recommendation made in its 1993 *Strategy for Biological Diversity*, in 1996 the Government set up an inquiry to identify and report on key issues of relevance to a Swedish strategy on plant genetic resources. In September 1996 the inquiry presented a report to the Government entitled ‘Biodiversity and future policy on genetic resources’, which contained a wide range of recommendations concerning future action by the Government. This report has subsequently been reworked and published in a popular scientific format, and also translated.

In May 1997 the Government reported to Parliament in a communication headed ‘The rights of the poor – our common responsibility’ how Sweden’s development cooperation could be strengthened to help achieve the overriding aim of combating poverty. This document makes it clear that the fight against poverty is fundamental to attaining the long-term goal of sustainable development incorporating economic, cultural, social and ecological sustainability.

This philosophy – the eradication of poverty as one of the fundamental prerequisites for sustainable development – was also put forward by the European Union, on Sweden’s initiative, as a draft recommendation concerning the forthcoming programme of work of the UN Commission on Sustainable Development, at the Special Session of the UN General Assembly in the summer of 1997. It was subsequently adopted as an

overriding theme, together with the importance of achieving sustainable consumption and production patterns.

Action within the European Union

The conservation of biodiversity is one of four priority areas of Sweden's EU policy in the environmental sphere. Sweden is involved in the elaboration of a Community Biodiversity Strategy. Regarding the EU's two nature conservation directives, the Habitats and Wild Birds Directives, efforts to implement them at the national level – including the Natura 2000 network – are fully under way. Sweden has also – together with Finland – succeeded in securing certain additions to the annexes to the Habitats Directive (see chapter 6 for further details).

Another environmental problem which is of importance as regards biodiversity and to which Sweden has given priority is acidification. Sweden has been a driving force in the elaboration of a new EU strategy to combat acidification. When the measures linked to this strategy have been introduced, the acidification status of Sweden's lakes and running waters should be appreciably improved. This is essential if the ecosystems, species and genetic variability associated with the country's freshwater environments are to be conserved.

Sweden is also involved – in the framework of EU cooperation – in the process of negotiating a binding Biosafety Protocol under the Convention.

Sweden has participated in the preparation of a report from the European Environment Agency (EEA) on implementation of the Convention in the EEA member states.

Other nature conservation conventions

Other important conventions and intergovernmental processes with a bearing on biological diversity, and to which Sweden is a party, include:

- The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention).
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).
- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), and the agreements established under it on small cetaceans (ASCOBANS) and bats.
- The Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area and the Helsinki Commission (HELCOM).
- The Oslo and Paris Conventions and OSPARCOM.
- The North Sea Conference.
- Conservation of Arctic Flora and Fauna (CAFF).
- The International Whaling Commission (IWC).

As regards the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, it may be mentioned that Sweden's first Natural Heritage Site, the Lapponian Area, was recently inscribed on the World Heritage List. This area of mountain and montane habitats is of great value in terms of biodiversity.

Baltic Sea cooperation

The Baltic Sea, as a unique – but at the same time heavily polluted – semi-enclosed, brackish-water sea, is a particularly important focus of the intergovernmental cooperation in which Sweden is involved. HELCOM constitutes a natural forum for pursuing questions relating to the environment and biology of this sea area, particularly after the amendment of the Helsinki Convention in 1992 to include a new Article 15 on biodiversity. Under the auspices of HELCOM, the coastal states are involved in projects relating *inter alia* to the creation of marine reserves (Baltic Sea Protected Areas), shore protection and coastal dynamics. The International Baltic Sea Fishery Commission, in which negotiations take place on total allowable catches of various target species, is another important forum, not least when it comes to safeguarding the Baltic's remaining natural populations of salmon (*Salmo salar*) (see case study) and the commercially important cod (*Gadus morhua*).

Baltic Sea cooperation has also assumed the form of a project to draw up an Agenda 21 for the Baltic Sea Area – *Baltic 21*. Obviously, biodiversity will be one of the areas taken into account in this project. The Baltic 21 Secretariat is located in Stockholm.

Nordic cooperation

There is a long-standing tradition of environmental cooperation under the auspices of the Nordic Council of Ministers, including in the area of biological diversity. A range of projects with a bearing on biodiversity, such as environmental monitoring, indicators, natural forests, archipelagos and nature on the urban fringe, have been undertaken. One project (final report published in 1997) was designed to promote an exchange of experience between the Nordic countries concerning the early phase of implementation of the Convention, particularly with regard to the question of sectoral integration and responsibility. The Nordic countries are also collaborating on a state of the environment report, *Biodiversity 2000*.

4. The implementation process in Sweden to date

The emphasis in this chapter is on the actual *process* of implementing the Convention in Sweden. Objectives are described in chapter 5 and action taken and planned in chapter 6. The early stages in the implementation of the Convention at the national level in Sweden have consisted primarily of the following:

- ratification in 1993,
- adoption of the *Strategy for Biological Diversity* (1994),
- preparation of a country study (1994),
- presentation of sectoral action plans (1995) and
- the Government's responses to these action plans (1997).

The involvement of relevant sectors – both sectoral authorities and the private elements of the different sectors – has characterized the early implementation phase in Sweden. It was made clear in the *Strategy* that the following sectors in particular should be involved in promoting the conservation and sustainable use of biological diversity:

- forestry,
- agriculture,
- fisheries and aquaculture,
- reindeer herding and
- the building and physical planning sector.

Attention was also drawn in the *Strategy* to the importance of conservation and sustainable use of biodiversity in Sweden's development cooperation programme.

The Government and Parliament have subsequently decided that efforts to promote biodiversity should be broadened to include further sectors and sectoral authorities. The decision taken makes specific mention of the energy, transport and tourism sectors.

4.1 Preparation of the country study

An important initial step in implementing the Convention, in line with Article 7, is to identify what components of biological diversity are to be found in the country and to identify processes and categories of activities which have, or are likely to have, significant adverse impacts on biodiversity. As early as 1993, therefore, the Swedish Government initiated the process of drawing up a Swedish country study.

A factor of fundamental importance to the success of subsequent efforts to meet the country's obligations is that different actors and sectors of society – which have an impact and/or are dependent on biodiversity/biological resources – have a *common view of what the problems are*. What ecosystems, species and genes do we have; what has been lost up to the present time; and what are the key factors with adverse or beneficial impacts?

The task of preparing a country study was entrusted to the Environmental Protection Agency, the central government authority in the environmental sphere. That task was

to be discharged, however, in close collaboration with a number of sectoral agencies: the Swedish Board of Housing, Building and Planning, the National Board of Fisheries, the Swedish Board of Agriculture and the National Board of Forestry. Several institutions, such as the Swedish University of Agricultural Sciences, the Swedish Threatened Species Unit and the Nordic Gene Bank, also contributed to the process. All of these bodies were actively involved, providing drafts of different sections of the study. The Board of Agriculture, for example, and to some extent the University of Agricultural Sciences, the Threatened Species Unit and the Nordic Gene Bank, contributed to the chapter on the biodiversity of the agricultural landscape. The work was coordinated by a project manager and an editor based at the Environmental Protection Agency.

This broad approach was prompted by a desire to develop – through the process of drafting the country study – a common view of existing problems relating to biodiversity in Sweden. The scientific institutions had an important part to play in ensuring that the report was based as far as possible on scientific evidence.

A draft version of the country study was reviewed and discussed at a seminar attended by a wide range of representatives of different sectors, the scientific community, non-governmental organizations and county and municipal authorities. The purpose of the seminar was to obtain feedback on the draft, with a view to securing the greatest possible support for the country study and the conclusions drawn in it.

4.2 Preparation of sectoral action plans

The next step was to draw up action plans on a sector-by-sector basis. This task was delegated to the same authorities as had prepared the country study. On the one hand, the Government commissioned the Environmental Protection Agency to elaborate an action plan containing measures for the conservation and sustainable use of biological diversity; on the other, it requested the following sectoral agencies to draw up corresponding action plans from the vantage point of their respective sectors:

Swedish Board of Agriculture	Agriculture, horticulture and reindeer herding
National Board of Forestry	Forestry
National Board of Fisheries	Fisheries and aquaculture
Swedish Board of Housing, Building and Planning	Building and physical planning sector

The five action plans were presented to the Government in the autumn of 1995. In 1997 the Government stated its positions on the plans put forward by the Environmental Protection Agency and the Boards of Housing, Building and Planning, Agriculture, and Fisheries (see chapter 6 for further details). Regarding the Board of Forestry's action plan, the Government has stated that most of the measures proposed in it are of such a character that neither Parliament nor the Government needs to reach a position on them. They are well in line with the broad policy decisions that have been taken in the area of forestry.

Given the approach adopted by Sweden, a formal, comprehensive national action plan will not be compiled at the Government level. Instead, the five sectoral plans should together be regarded as forming the main core of Sweden's national action plan.

Division of responsibilities between the Environmental Protection Agency and the sectoral agencies

The Environmental Protection Agency's *Action Plan on Biological Diversity* (Report 4567) focuses on

- objectives for the conservation of biodiversity and the sustainable use of biological resources,
- tangible action in areas not covered by the sectoral agencies' terms of reference, and
- an assessment of the sectoral action plans.

The sectoral agencies' action plans place the emphasis on goals and measures directly relating to activities in the sectors concerned which in one way or another affect biological diversity. The guiding principle is to seek to make the sectors' activities ecologically more sustainable.

The drafting process

An important difference between the process of drafting the action plans and the procedure used for the country study was that each authority was now individually responsible for drawing up an action plan *for its own sector*. It was the task and responsibility of each sectoral agency to consider what measures needed to be taken in its sector to minimize the adverse impacts of that sector on biodiversity and to contribute instead to achieving the objectives of the Convention. This can be seen as a step towards implementing the explicit environmental policy of introducing fully fledged sectoral responsibility for the environment. In the past, the environmental authorities have often defined what measures are required in different sectors; now it was left to the sectors themselves to formulate action plans.

The terms of reference issued by the Government gave the authorities concerned a joint responsibility to ensure the necessary consultation and coordination. A joint coordinating group was set up for this purpose, which also included representatives of the other bodies that had contributed to the country study, together with the Swedish Museum of Natural History. In that there were, and are, many links between the five action plans, coordination was very important.

As far as possible, each of the agencies was expected to consult and secure support for its proposals within the sector concerned (the forestry sector in the case of the Board of Forestry etc.), and also among non-governmental organizations and the scientific community. All the authorities held seminars and/or workshops of one kind or another with the aim of incorporating outside views and ideas and achieving the greatest possible involvement among interested parties.

In line with the principle of sectoral responsibility and dialogue between the environmental authorities and the sectors concerned, the terms of reference issued to the Environmental Protection Agency – as the coordinating environmental authority – included a mandate to evaluate the sectoral agencies' action plans. In other words, it was to comment briefly in its own action plan on the plans put forward by the sectoral agencies: Are the proposed measures sufficient? Have the necessary cost-effective incentive measures been proposed? And so on. This evaluating role is to be regarded

as part of the dialogue mentioned above and as a manifestation of the increasingly important role which Sweden's environmental authorities have been given in monitoring and evaluating overall efforts to protect the environment. The experience gained in this respect is described in chapter 9.

4.3 Important partners in implementation

The task of fulfilling Sweden's undertakings under the Convention has naturally not been the exclusive concern of the Government, Parliament and central government agencies. Many other actors, both in the official sphere and within different economic sectors and the environmental movement, have contributed in various ways to the early phase of implementation.

Exciting process in the forestry sector

Of the various sectors of economic activity, it is perhaps in agriculture and forestry that the Convention has so far most clearly made itself felt. Since these two sectors are important in Sweden, both economically and in terms of the areas of land they affect, they have a very significant part to play in efforts to maintain biodiversity. Long before the Convention was signed, processes were under way in both agriculture and forestry to bring about changes which would enable these sectors to contribute more effectively to meeting the environmental objectives laid down by the Swedish Parliament and Government. An important element in these processes was greater regard to the needs of nature conservation in day-to-day operations.

Following the signing of the Convention, attention was focused even more sharply on the biological wealth of the agricultural and forest landscapes. In 1993 a new forestry policy was adopted in Sweden, according to which environmental and production objectives were to carry equal weight. The environmental objective stipulates, among other things, that the biological diversity and genetic variation of forests are to be safeguarded and that forests are to be managed in such a way as to enable viable populations of plant and animal species occurring naturally there to survive in natural surroundings. In addition, threatened species and habitat types are to be protected.

As a result of the new forestry policy, the forestry sector has intensified its efforts to live up to the goal of conserving biodiversity. Key elements in achieving this objective have included (and continue to do so) information and advice, small-scale habitat protection and differentiated forestry geared to the requirements of nature conservation. Throughout the 1990s, knowledge and skills in the area of biodiversity have undoubtedly developed appreciably across virtually the whole of the forestry sector. The standardized silvicultural practices of the past have been superseded by a flexible approach in which nature conservation and biodiversity carry a great deal more weight than they used to do.

Both forest companies and small-scale private forest owners are undertaking a variety of measures to promote biodiversity. Important instruments in this context are action programmes and environmental and nature conservation policies. The majority of forest companies have also introduced some form of eco-management and audit system. Most major forest companies publish environmental reports or accounts,

describing their environmental performance. The large companies are undertaking, at their own expense, surveys of key habitats corresponding to the state-funded surveys carried out by the National Board of Forestry on forest land owned by private individuals (a 'key habitat', as defined by the Board of Forestry, is an area which supports or may be expected to support nationally red-listed species). Different forms of landscape planning, which for example take account of these key habitats, are an important element in the activities of most of the major companies. Such a framework makes it possible to focus on biodiversity at a landscape level and thus to link ecological structures within the landscape. Several companies have also set aside significant areas, e.g. 'special care areas', for the purpose of conserving fauna and flora. 'Site adaptation' – matching silvicultural methods to specific site conditions within a forest stand – is another key concept in the sector's progress towards sustainable forestry. Other measures include information and continuing training for companies' own employees and in relation to private forest owners.

Different companies, like individual forest owners and their organizations, seek to promote biodiversity in their own specific ways and according to their own circumstances. To achieve good conditions for forest biodiversity, it is presumably also necessary to have a diversity of strategies and approaches.

A new, voluntary instrument is the forest certification system. In Sweden, discussions within the Swedish FSC Working Group resulted in a preliminary agreement being reached in June 1997 on a Swedish FSC standard for forest certification. This agreement was entered into between representatives of the larger forest companies, voluntary, environmental NGO:s the trade unions concerned, the indigenous Sami community and a number of furniture manufacturers. The draft national standard is an attempt to adapt general FSC principles and criteria to Swedish conditions. The proposals comprise a standard for forestry, guidelines on applying the standard, and advice on monitoring, evaluation and labelling. As from the beginning of 1998, it should be possible for Swedish forest owners and forest companies to certify their forest holdings and forestry methods through the FSC. In parallel with FSC certification, several forest companies can and have adopted the ISO 14001 environmental management system, which lends further impetus to environmental protection efforts.

The forest owners assosiations (mainly small forest owners) are developing environmental standards as an elternative to the FSC-standards.

It should be noted that the development of environmental standards has taken place entirely outside that part of the national implementation process which is controlled by Parliament and the Government and carried out primarily by the various agencies of central government. The strength of the certification scheme lies in the fact that it allows market mechanisms to operate and in the signals which certification – or the lack thereof – will send to all consumers and competitors on the market.

Agriculture an important 'producer' of biodiversity

A high level of activity can be noted in the agricultural sector, too. A great deal of work is being done with the aim of reconciling market calls for product quality and care of the environment with profitability for producers. The demand for organically

grown produce, for example, is rising steadily. A few years ago, the Federation of Swedish Farmers (LRF), a national organization, launched a consumer policy action programme: 'Towards the world's cleanest agriculture'. One project, run by LRF and farmers themselves, involves a type of 'environmental survey' of farms: using check-lists, farmers take stock of and document the environmental situation on their own holdings, among other things with regard to biodiversity. An important element in this context is a management plan for the natural and cultural heritage features of the holding, which every farm joining the environmental survey scheme is expected to have. Other environmental activities in the agricultural sector include eco-management systems, which incorporate environmental policies and objectives, action plans and documentation of action taken. Annual environmental accounts, with key ratios reflecting environmental performance, are also published.

Another major project is the information campaign on the biodiversity of the farmed landscape, which is admittedly being run by the Swedish Board of Agriculture, but in which LRF is playing an active part, e.g. through study circles (see 6.8).

The biggest single contribution being made by the Swedish farming community is presumably its role in 'producing' biological diversity by maintaining livestock grazing on some 350,000 ha of semi-natural pasture-land. The biodiversity associated with semi-natural forage areas (pastures and meadows) will of course only be maintained if grazing management continues. Today, appropriate management is a 'public good' which society – the state – is prepared to pay for, and such payments are now in fact being made through schemes set up under the EU's Agri-Environment Regulation (see the case study on the Swedish agri-environmental programme for further details).

The fishing industry

The fishing industry, too, is demonstrating a greater involvement and interest in environmental aspects of its activities, including sustainable use of the biological resources of seas, lakes and rivers. The industry has long harvested these resources in line with a principle of stewardship, which has had the aim of ensuring that fish stocks can continue to be used in the long term. In addition, the sector is involved in various ways in fisheries conservation. Within the sector, the question of environmental labelling of fish is being discussed, a discussion in which both consumers and the fishing industry, producers, authorities and environmental organizations are represented. At the international level, a similar process is under way under the auspices of the Marine Stewardship Council.

Local Agenda 21 a powerful process at the municipal level

Agenda 21 has had a widespread impact in Sweden, especially at the local level. Local Agenda 21 projects are in progress in basically all of the country's municipalities. Some local authorities have made biodiversity an integral part of this process, whereas in other municipalities it has received little attention in the Local Agenda 21 context. Approaches to biological diversity and levels of activity in this area are decided by each individual municipal authority and are thus not controlled by central government. This is generally speaking a cornerstone of the relationship between central and local government. In other words, municipalities enjoy a high degree of independence in the design of their policies and actions.

Local authorities naturally have a very important part to play in implementing the Convention. Clearly, though, many authorities are having difficulty deciding how they can or should address the question of biodiversity. The concept of biological diversity needs to be made more tangible and easier to handle, to allow Chapter 15 of *Agenda 21* to make a greater impression at the local as well as the national level (see chapter 9).

Nevertheless, it should be observed that Sweden's municipal authorities have in general become steadily more involved in nature conservation in recent years. More authorities than ever are establishing their own nature reserves, for example. There are, though, significant differences between municipalities, both in terms of commitment and as regards expertise and resources.

Sami efforts in the area of biodiversity

The Sami are the indigenous population of Sápmi. In addition to parts of Sweden, Sápmi comprises certain areas of Norway, Finland and Russia. The role and position of indigenous populations is dealt with specifically in the Rio Declaration (Principle 22) and *Agenda 21* (Chapter 26, 'Indigenous People'), and consequently the Sami have primarily worked on the basis of *Agenda 21*. However, as readers will be aware, the Convention also contains provisions on indigenous communities. The Swedish Sami Parliament, which is at once a parliamentary assembly and a central government authority, has drawn up a special document: 'Sápmi – Our Common Heritage'. This document can be said to express the environmental philosophy of the Sami Parliament, and it is intended to form the basis for reaching positions and participating in decision-making on Sápmi's natural and environmental resources.

The National Union of the Swedish Sami People has drawn up a policy platform entitled 'Sami Choices, Agenda 21 – Action plan on environment and democracy issues'. The development and implementation of 'Sami Choices' is very much an ongoing process. One way of securing greater attention to the environment has been to appoint special environmental coordinators in every reindeer husbandry district and Sami association. In addition, the National Union has been involved in drawing up proposals for a research programme on 'Sustainable use of Sweden's mountains'.

The documents mentioned touch on biodiversity in several ways, directly or indirectly. For the Sami, the link between biodiversity and reindeer herding and the management of, in particular, the renewable biological resources of Sápmi are of course fundamental considerations. Specific issues generating a great deal of concern within the Sami community are the management of populations of small-game species, and the conflicting goals of reindeer herding and conservation of large predatory mammals.

The principal livelihoods of the Sami – reindeer herding, hunting and fishing – are based to a large extent on traditional knowledge and practices, which are given prominence in the Convention on Biological Diversity, e.g. in Article 8(j). The Swedish Sami Parliament has initiated cooperation among the Nordic Sami communities to analyse the implications of the Convention's provisions about respecting, preserving and promoting the wider application of traditional knowledge and practices, and to

consider how equitable sharing of the benefits arising from the utilization of such knowledge can be achieved.

Important contributions made by non-governmental organizations

As has already been noted, the environmental movement was involved in efforts to conserve biodiversity long before the Convention came into force. The movement plays a major and significant role in opinion-forming and public education, e.g. through campaigns and study circles. It also seeks to influence decision-makers at different levels. Perhaps its most important role, though, is at the local level, e.g. in efforts to ensure that the conservation interest of valuable natural areas is not destroyed by development or unsuitable land use. Many organizations are also actively involved in and providing an impetus for Local Agenda 21 activities. The Swedish Society for the Conservation of Nature, for example, has local branches in virtually all the municipalities in the country.

Several nature conservation organizations have a long-standing tradition of tangible efforts in the area of species conservation, often in project form. In addition, the Society for the Conservation of Nature and WWF, for instance, have in recent years launched projects focusing on different habitat types and entire ecosystems. The work being undertaken to save the white-backed woodpecker (*Dendrocopos leucotos*) is described in one of the case studies in this report. Flora and fauna 'warden' schemes (to guard plant and nest sites) are another tangible form of action that has been taken by voluntary organizations. The involvement of the Society for the Conservation of Nature and the group 'A Step Ahead' in developing inventory methods and carrying out inventories of valuable forests in inland areas of northern Sweden can be cited as a particularly successful example of voluntary efforts in this area.

Mention should also be made in this context of hunters' organizations, whose activities include wide-ranging educational programmes, research and species conservation projects, and of anglers, who are very active in the conservation of aquatic habitats and their fish populations. Many individual farmers and specialized associations play a significant part in safeguarding the long-term survival of endangered local livestock breeds and crop varieties.

The environmental movement is also involved in regional and international cooperation. To promote environmental cooperation around the Baltic Sea, for example, an organization called Coalition Clean Baltic has been established. Efforts to preserve natural forests of great conservation value are being coordinated by the circumpolar Taiga Rescue Network.

WWF, the Swedish Society for the Conservation of Nature, Future Earth and Friends of the Earth Sweden have well-developed networks of projects and cooperation with sister organizations in the South and the East. Among other things, these networks provide a channel for supporting activities associated with the conservation and sustainable use of biodiversity. An estimated SEK 50 million a year is transferred via these organizations to organizations in the developing world and eastern Europe which are engaged in activities relating to biodiversity.

5. Objectives relating to biological diversity

This and the following chapter give a brief summary of the objectives that have been defined in relation to biological diversity in Sweden and of the action taken and planned with a view to implementing the Convention in this country. The account of measures implemented and planned is intended as an overview, rather than as an exhaustive presentation. It is structured around the five action plans mentioned earlier, and hence, broadly, around the division of responsibilities between sectors which guided the elaboration of the plans. The action plans contain additional objectives and measures relating to biodiversity. Research and education are dealt with in separate sections of the next chapter.

Since conservation and sustainable use should be seen as two sides of the same coin, it is not entirely easy to distinguish between objectives relating to these two concerns.

Clearer and better structured goals are needed in the context of environmental and biodiversity policy. New national environmental objectives therefore need to be developed. These objectives should guide environmental protection efforts in Sweden and define the state of the environment or the standard of environmental quality that is required if Swedish society is to be ecologically sustainable.

The Government is currently drafting an overall Environmental Policy Bill, which will be presented in the course of 1998. The Government intends to propose new national environmental objectives, which will in turn form the basis for more specific goals and measures in different sectors of society. The intention is that the more precise definition of the latter goals should be undertaken by the various actors, in different sectors, whose activities are of relevance to the environmental and biodiversity objectives adopted. By means of an ongoing process of management by objectives and results, these new goals will be monitored and revised as new knowledge emerges..

5.1 Objectives concerning the conservation of biodiversity

As early as 1991, the Swedish Parliament and Government adopted an overall objective for biodiversity: ‘Biological diversity and genetic variation should be safeguarded. Plant and animal communities should be maintained so as to enable viable populations of plant and animal species occurring naturally in Sweden to survive in natural surroundings.’

As part of a forestry policy decision in 1993, Parliament adopted an environmental objective for forestry: ‘The biological diversity and genetic variation of forests should be safeguarded. Forests should be managed in such a way as to enable viable populations of plant and animal species occurring naturally there to survive in natural surroundings. Threatened species and habitat types should be protected.’

In conjunction with decisions on agricultural policy, the following objective, among others, has been defined: ‘The environmental objective of agricultural policy is to safeguard a rich and varied agricultural landscape and its cultural assets, to conserve

biological diversity and to minimize the environmental impact of agriculture attributable to nutrient leaching and use of pesticides.'

The environmental policy decision taken in 1991 also laid down a goal concerning the introduction of non-native (alien) species and genetically modified organisms (GMOs): 'The introduction of non-native species and genetically modified organisms should only be undertaken with considerable restraint and subject to adequate controls, so as not to jeopardize the conditions required by native flora and fauna.'

The goals set out above mean that:

- the functioning of ecosystems must be maintained,
- viable populations of species must be maintained within their natural distribution ranges,
- genetic variation – both within and between populations – must be maintained, and
- ecosystems, species and populations must not be threatened by introductions of species or populations which are not native to the country, or by introductions of genetically modified organisms.

Viable populations of species occurring naturally in the country will only be maintained provided that sufficient areas of habitat for these species (ecosystems and habitat types), exhibiting the necessary characteristics, are preserved. There need to be environments in which plants can grow, animals nest etc., but also environments for other functions, such as reproduction, growth to maturity, foraging and migration.

The EU's two directives in the area of nature conservation (the Wild Birds Directive and the Habitats and Species Directive) are to be implemented in Sweden. Sweden has also made undertakings by ratifying a number of international agreements, including the Bern, Bonn, CITES and Ramsar conventions. Many of the country's species and populations are currently in a precarious situation; the long-term survival of viable populations of these species is not assured. Such species include those which have been assigned in the national Red Lists to the Endangered and Vulnerable categories. In addition, many species have been classed as Rare or Care-demanding. It is therefore necessary to define goals for particular categories of species. The goals below can be regarded as more precise statements of the overall objectives for *subsets* of all the species occurring naturally in Sweden:

- Species listed in the EU's Habitats or Wild Birds Directive should be maintained, or restored, at favourable conservation status.

- Conditions should be created which allow threatened species to increase in numbers and spread to new sites throughout their natural distribution ranges, so as to safeguard populations that are viable in the long term.

5.2 Objectives concerning the sustainable use of biodiversity and biological resources

All use of biological resources – and of biological diversity as such – should be undertaken in a sustainable manner, i.e. in a way and at a rate that does not lead to the

long-term decline of biological diversity. This follows from the provisions of the Convention itself.

As early as 1988, in conjunction with the Environmental Policy Bill presented at that time, the Swedish Parliament adopted the position that all the different sectors of society have a responsibility for the environment. This responsibility for protecting the environment and making careful use of natural resources places an obligation on those engaged in economic activities, and the authorities concerned, to bring their activities into line with existing environmental objectives. Conservation and sustainable use must be integrated into the activities of all sectors, and at all levels and in all areas of society. The strength of the principle of sectoral responsibility lies in the fact that sectors themselves are best placed to ensure the sustainable use of biodiversity.

The Swedish Government's *Strategy for Biological Diversity* states that environmental objectives must be accorded the same weight and importance as economic considerations, in order to ensure an ecologically sound basis for human activities.

The Swedish forestry policy adopted in 1993 puts environmental and production objectives on an equal footing. This means that biological diversity must be conserved and that forestry methods must be adapted to take account of new knowledge about the state of the natural environment and the natural regeneration processes of forest ecosystems.

The Government Bill 'Sustainable Fisheries and Agriculture', presented in 1997, emphasizes the need to make the Common Fisheries Policy of the European Union sustainable in the long term. The existing policy should be developed so as to help achieve this objective. Sweden will be actively seeking to ensure that environmental objectives are developed for the fishing sector. Swedish fishing activities must be undertaken in a sustainable manner. Optimum use of fish stocks must be achieved at the national level by applying the precautionary principle and by safeguarding biological diversity. Future environmental efforts in the area of fisheries must be based on the principle of sectoral responsibility for the environment.

The same Bill deals with the environmental aspects of agriculture. The Government makes it clear that the EU's Common Agricultural Policy (CAP) needs to be changed with a view to achieving environmentally sounder agriculture. An environmental goal should be incorporated in the CAP, with equal status to its other objectives. General standards of environmental care, in the framework of the polluter pays principle, should also apply in the agricultural sector.

The Government has underlined the importance of further efforts to develop sustainable use criteria and objectives in the fisheries and agricultural sectors.

Much remains to be done in terms of defining sectoral objectives focusing on sustainable use. There is also a great need for regionalized objectives, i.e. objectives tailored to the conditions existing in specific counties and municipalities.

6. Action taken and planned

This chapter gives an account of, on the one hand, the action which has been or is currently being taken and, on the other, measures that are planned. It also refers to a number of areas with particular needs in terms of further action. In addition, where relevant, timetables for the subsequent implementation process are given; in most cases, however, no specific timetable for implementing the measures planned has been set.

6.1 Towards an ecologically sustainable Sweden

The challenge of achieving ecologically sustainable development in Sweden is one of the most important facing us on the eve of the 21st century. Within the Government, a special delegation has been set up to address this major challenge. The overarching objectives which an ecologically sustainable society must meet are protection of the environment, efficient use of resources, and a sustainable supply of energy, food and other resources. In line with Agenda 21, efforts to bring about such a society are proceeding from the close links between environment and development.

The programme for ecologically sustainable development which is being developed by the delegation does not deal specifically with biological diversity. However, the conservation of biodiversity should be seen as one of several basic criteria of sustainable development. All use of biological resources – and of biological diversity itself – must be sustainable. It thus follows that conservation and sustainable use are important elements in the process of achieving ecologically sustainable development in Sweden. The programme to attain this aim can be related to the action being taken in the physical planning sector (see 6.6 below).

In the course of 1997, the delegation has presented guidelines on how the SEK 5.4 billion allocated to the programme by the Government and Parliament is to be used. Most of the funds are to be allocated to special local investment programmes, through which municipal authorities can now apply for grants for local projects. State grants will primarily be made available for investment projects, which should also promote employment. Local authorities intending to participate are expected to give companies, organizations, individuals etc. in their areas the opportunity to submit project proposals. Funds can be awarded for public education projects, for example.

‘Conservation and enhancement of biological diversity’ is one of the criteria to be applied in the assessment of project applications. It is too early at present to say to what extent projects focusing on biodiversity will be included in local programmes. The aim, however, is that the programme for ecologically sustainable development will help to conserve biodiversity in Sweden.

6.2 Action relating specifically to environmental protection and nature conservation

In 1997 the Government presented a Bill in which, among other things, it set out its views on and confirmed the measures proposed by the Environmental Protection

Agency in its *Action Plan on Biological Diversity*. In addition, the Government is preparing an overall Environmental Policy Bill, which is to be put before Parliament in 1998.

The principle of sectoral responsibility and integration is a cornerstone of Sweden's environmental policy and has had a far-reaching impact, not least with regard to biodiversity. It is intended that the sectoral authorities in the energy and transport sectors, too, will in future integrate the promotion of biodiversity in their planning and operations. The Swedish Tourist Authority has already been entrusted with the task of elaborating criteria, policies and strategies for the sustainable development of tourism. Follow-up of sectoral integration is to be clarified and improved.

Action taken or in progress

Legislation and regulations

The Swedish Parliament has passed new legislation which, together with the EU's CITES Regulation, provides for stricter controls on trade in and transportation of endangered plants and animals. The Swedish Coast Guard will have greater police powers to prevent illegal trafficking in endangered animals and plants. Sweden has also introduced certain legislative changes to implement the EU's nature conservation directives.

Land drainage is already banned in large areas of southern Sweden, as a result of the substantial disturbance of wetlands that has occurred in this part of the country. Further extension of the area where land-drainage is prohibited is under consideration. The restriction of land-drainage is significantly improving the prospects of conserving wetland flora and fauna.

In 1994 Sweden introduced new legislation on the contained use and deliberate release of genetically modified organisms (GMOs), corresponding to the EU's two directives in this area. The law is also applicable when products containing or consisting of such organisms are released onto the market. Its purpose is to protect human and animal health and the environment, and to maintain ethical standards in GMO-related activities. A revision of this legislation is planned.

Protection and management of areas of particular value

The protection and management of areas of particular value in terms of biodiversity remains a priority in Sweden's environmental policy. In all, the Swedish state allocates some SEK 200 million a year to safeguarding natural areas of conservation interest. The total area protected in Sweden at the end of 1996 was 3.7 million ha (including a land area of just over 3 million ha). This includes national parks, nature reserves, nature conservation areas, wildlife sanctuaries, small-scale habitat protection and natural monuments. Together these sites cover around 8 per cent of the area of Sweden.

The *Strategy for Biological Diversity*, like the forestry policy decision of 1993, lays particular emphasis on giving greater protection to Sweden's remaining natural forests, which estimates indicate make up just a few per cent of the total area of forest land .

Over the period 1992–96, protected status was given to 290 forest sites with a total area of 96,000 ha, including just over 46,000 ha of forest land producing more than one cubic meter/year. Around 832,000 ha of productive forest is now protected, which is 3.6 per cent of all forest land producing more than 1 cubic meter/year in Sweden. Of this area, montane forests account for roughly 660,000 ha, with around 172,000 ha located outside the montane zone. The proportions of forest land producing more than 1 cubic meter/year which are safeguarded in these two categories are roughly 43 and 0.8 per cent, respectively. If the montane zone is excluded, a total of about 1 per cent of such forest land is protected. In addition, on some 3.6 million ha of forested land which is not classed as productive, felling may only be carried out in exceptional circumstances and only with respect to individual trees.

Conservation plans have been drawn up for mires of particular conservation value, for agricultural landscapes with especially valuable meadows and pastures, and for marine reserves. These plans are currently being implemented. Of Sweden's 30 'wetlands of international importance', or Ramsar sites, 26 are fully or partially protected under the Nature Conservation Act, corresponding to 66 per cent of the total area (June 1997). A further 5 per cent of the area is in state ownership. As regards marine areas, Sweden is also taking steps to safeguard the Baltic Sea Protected Areas that fall within Swedish waters (an undertaking under HELCOM).

In the 1990s, municipal authorities, too, have begun to establish increasing numbers of nature reserves, based on municipal decisions and funding. At the end of 1996, the number of local reserves was 48, with a total area of just under 4,400 ha. These areas are a very important complement to the reserves designated by central government.

Successful implementation of EU nature conservation directives

The European Union has two directives specifically concerned with nature conservation, namely the 1979 Wild Birds Directive (79/409/EEC) and the 1992 Habitats and Species Directive (92/43/EEC). Sweden has made substantial efforts to put these directives into effect. An important element in that process is the creation of Natura 2000, a coherent European network of protected natural areas within the EU. As of June 1997, the Swedish Government had proposed a total 1,122 sites to the European Commission for inclusion in Natura 2000, with a combined area of just over 40,000 sq km. 225 sites have been designated as Special Protection Areas under the Wild Birds Directive, and these are automatically included in Natura 2000. Sweden is the member state which has hitherto proposed the largest total area of Natura 2000 sites.

Sweden has also, in collaboration with Finland, provisionally secured important additions to the annexes to the Habitats Directive, in the form of Nordic species and habitat types (although the Council had still to reach a final decision on the matter at the time of writing). In addition, as a result of the combined efforts of Sweden and Finland, some of the habitat definitions included in the Habitats Directive have been modified to take better account of conditions in the Nordic region.

Introduction of alien species and genes

The Environmental Protection Agency has compiled overviews of the current state of knowledge in this problem area (for the marine, freshwater and terrestrial environments). These overviews form an important basis for assessing existing threats and considering further action. The Agency has also drawn up a policy on the introduction and spread of alien and genetically modified organisms.

Basic documentation and procedures for risk assessment relating to the introduction of alien species and genes are currently being developed by the Swedish Biodiversity Centre, in collaboration with the Environmental Protection Agency and the sectoral authorities and sectors concerned. In addition, information activities are planned in this area.

Work on Red Lists continues

Special action programmes have been adopted for five species and habitats. A system for determining priorities with regard to species-specific measures is being developed. In conjunction with this, a study is being made of the concept of 'species of international importance', for which Sweden has a special responsibility. Work is to begin on a Red List of habitats. In addition, the Swedish Threatened Species Unit is continuing its efforts relating to national Red Lists of species, including preparing lists of further groups of organisms and adapting existing lists to the IUCN's new threat categories and criteria for national Red Lists.

Special inquiry to develop a coherent policy on predatory mammals

Sweden holds a not insignificant proportion of Europe's populations of four large predatory mammals: the brown bear (*Ursus arctos*), wolf (*Canis lupus*), wolverine (*Gulo gulo*) and lynx (*Felis lynx*). In the national Red List, the wolf is classed as critically endangered, the wolverine as endangered, and the lynx and brown bear as vulnerable. These classifications are preliminary assessments by the Threatened Species Unit, based on the new IUCN criteria and categories. In reindeer-herding areas – and in general in areas where domesticated animals are reared – growing populations of predatory mammals are often seen as a problem by the sectors concerned. Partly for this reason, the Government will shortly be issuing terms of reference for an inquiry which will have the task of putting forward proposals for a coherent policy on predatory mammals, taking biological factors and hunting and economic activities into account. The inquiry will be undertaken in consultation with the authorities concerned, the Sami community, NGOs and researchers in this field.

Inventory of lakes and watercourses

There are major gaps in our knowledge about the biodiversity of aquatic environments. The Government and Parliament have therefore decided that a nationwide inventory of lakes, rivers and streams is to be carried out. The project will include assessments of nature conservation value and the elaboration of a site safeguard plan. This inventory has the potential to greatly enhance our current understanding of the biological diversity associated with fresh waters.

Study of subsidies with adverse effects on the environment

At the Government's request, the Environmental Protection Agency and the National Audit Bureau are carrying out a survey of state subsidies which may be assumed to have adverse effects on the environment, including on biodiversity. The two agencies have also been asked to propose changes to the relevant rules.

Further action planned – the environmental protection and nature conservation sector

Environmental Policy Bill

The Government will be putting a broad-based Environmental Policy Bill before Parliament early in 1998. This Bill is intended to set out how environmental policy can be developed further to help solve the major environmental problems which exist and enhance the conservation and sustainable use of biodiversity. It will include proposals for new environmental objectives, which are intended – by means of a modern process of management by objectives and results – to promote further progress.

Environmental Code

In December 1997 the Government put forward proposals for a coherent body of environmental legislation, in the form of an Environmental Code, which will strengthen environmental law in a number of respects. The overall objective of the Code will be to safeguard sustainable development, so as to assure now living and future generations of a healthy and clean environment. It will affirm that the concept of sustainable development has inherent in it a recognition that the natural environment merits protection and that the right of human beings to change and use the environment has attached to it the responsibilities of stewardship. In a framework of sustainable development, natural resources should be used in such a way as to achieve the objectives of the Environmental Code, including the conservation of biodiversity and the protection and management of valuable natural and cultural environments. Several of the proposals that were put forward in the action plans are considered together with the draft Code.

Reserve designation to continue

It is very important to protect and manage areas which are of particular value in terms of biodiversity. The important and necessary changes now being made in the various primary sectors have not diminished the need to protect and manage valuable sites. In some areas it may be difficult, if not to say impossible, to reconcile continued use with the conservation of threatened biodiversity.

The remaining virgin and natural forests are of particular significance in this context. The question of future efforts to protect valuable forest land was studied in 1997 by the Government's Environmental Advisory Council. The Council's report concludes that, in the short term, a further approximately 700,000 ha of productive forest land outside the montane zone should be safeguarded for the purpose of conserving biodiversity. This target should be met within ten years, i.e. by the year 2007. This is judged to be necessary if Sweden's naturally occurring forest species are to be preserved.

According to the Council, the proposed target should be achieved by a combination of reserves established under the Nature Conservation Act (some 250,000 ha), small-scale habitat protection (around 25,000 ha) and voluntary undertakings by the forestry sector (the remainder).

How much forest land will need to be protected in the long term is difficult to assess.

Sweden's contribution to Natura 2000

Since joining the European Union in 1995, Sweden has taken steps to implement EU legislation in the field of nature conservation. The purpose of Natura 2000 is to establish a coherent European ecological network, primarily under the Wild Birds and Habitats Directives. So far, the list of candidate sites submitted to the European Commission by Sweden includes a total of 1,122 areas, covering 40,000 sq km. Further sites will be added in the course of 1998.

6.3 Forestry

The National Board of Forestry's *Action Plan for Biological Diversity and Sustainable Forestry* is commented on in the Government's Budget Bill for 1998, which confirms that the plan constitutes a valuable and detailed basis for the continuing efforts of the Forestry Administration and others to promote forest biodiversity. Progress in implementing the different measures in the plan can be summed up as follows:

Developing strategies and objectives for biodiversity at the regional level

The development of strategies and objectives for biological diversity at the regional level is one of the most important elements in the action being taken by the Forestry Administration. Work in this area has now begun and it will be intensified in the autumn of 1997 and in 1998, partly with a view to ensuring more effective planning and implementation of the new advisory campaign 'A Greener Forest' (see also the case study on 'A Richer Forest'). The county forestry boards' 'Green Forestry Plan' will be brought into use in spring 1998. The new forestry plans now being launched proceed from the equal status given to environmental and production objectives for forestry. They are designed to ensure broader and more in-depth attention to the natural environment and biodiversity. This may be expected to have considerable and, in the long term, beneficial effects on the biodiversity of forests.

Strategy for the conservation of forest genetic resources

The National Board of Forestry is currently developing a national strategy to conserve the genetic resources of Swedish forest trees. This important work will be shaped to a large extent by the wide range of international activities in progress in this area, including under the auspices of the EU and FAO.

Inventory work and enhancing current knowledge

The nationwide inventory of wet forests now in progress will be completed and evaluated in 1998. This inventory will cover the most valuable wet-site forests in terms of biodiversity. A survey of key habitats will also be completed in 1998, and is intended to be evaluated in 1998/99 (a 'key habitat' is an area or site which supports

or may be expected to support nationally red-listed species). A progress report was presented in 1997. These two inventories will greatly enhance our knowledge of forests which are of value from the standpoint of biodiversity.

A register of *flora and fauna sites* has been established and is gradually being brought into use. A trial scheme is in progress to improve documentation serving as a basis for consultation between the forestry and reindeer-herding sectors.

Advice, information and education

Efforts are currently being made to improve levels of knowledge about fundamental aspects of conservation and sustainable use, by means of individual advice targeted on landowners whose holdings contain assets of particular value, including key habitats.

The advice campaign 'A Greener Forest' is expected to be launched during the 1998/99 season. It will place a great deal of emphasis on integrating production and protection of the environment, especially biological diversity. The latter will be considered *inter alia* from the viewpoint of landscape ecology.

Several county forestry boards are providing training for contractors, machine operators and forest workers in nature conservation techniques and in the adaptation of silvicultural methods to the needs of the natural environment and to specific site conditions. Training is also being given to forest planners and Forestry Administration officials concerning habitats and species which serve as indicators of high nature conservation interest. An indicator species flora will be completed in the course of 1998. In addition, education has been introduced in the form of occasional courses on the role of fire in regeneration and nature conservation.

Nature conservation agreements are an important tool in conserving biodiversity in certain forest environments.

Monitoring, evaluation etc.

Monitoring and evaluation of the effects of forestry on biodiversity are being undertaken in collaboration with, among others, the National Board of Forestry and the Environmental Protection Agency.

The development of projects and programmes in the framework of the EU's LIFE fund has resulted in co-financing of several projects, including 'White-backed woodpecker landscapes and new nature reserves' (see case study) and 'Sustainable forestry based on landscape analysis in collaboration with local partners'.

Research and development

A wide range of research and development relating to biodiversity is being undertaken, chiefly at the Swedish University of Agricultural Sciences and the Forestry Research Institute (SkogForsk).

Further action planned – forestry

Implementation of the *Action Plan for Biological Diversity* is continuing. One of the most important elements is the development of strategies at a regional level, including

both analyses of deficiencies (deficiencies in the landscape with regard to factors of importance for biodiversity, such as deciduous trees, old-growth forest and dead wood) and objectives and measures.

6.4 Agriculture and reindeer herding

The action plan presented by the Swedish Board of Agriculture has been confirmed in a Government Bill on Sustainable Fisheries and Agriculture, in which the Government describes the plan as a valuable contribution to efforts to ensure the conservation and sustainable use of biodiversity. It is emphasized that the action plan should be kept up to date and that implementation should continue and be completed, with the aims of conserving those natural and cultural assets of the farmed landscape which are favoured by management and minimizing the adverse environmental effects of agriculture.

The Swedish agri-environmental programme implements on a national basis the EU's support arrangements for environmental measures in agriculture (Council Regulation (EEC) No. 2078/92). The introduction of the programme in 1995 provided Sweden with a powerful tool for conserving and enhancing the biodiversity of the agricultural landscape, and it is consequently the most important instrument in the implementation of the action plan (although additional measures are needed to achieve the plan's objectives). The Government has proposed an increase of SEK 700 million in total annual funding for the agri-environmental programme from 1998 on. This will make it possible to be more ambitious in terms of making agriculture environmentally more sustainable, as well as to ensure greater success in achieving objectives and to increase the area targets for some of the component schemes. Other changes to the agri-environmental programme include simplifications, *inter alia* concerning the classification and partitioning of hay meadows and grazing lands, which are of great importance in terms of biodiversity.

The Board of Agriculture's action plan for the conservation of biodiversity in the agricultural landscape, in reindeer herding and in the livestock sector is divided into a number of areas for which objectives have been defined. In the case of the agricultural landscape, they are: hay meadows, grazing lands, small-scale habitats on arable land (including wetlands and ponds), arable weeds, the farmstead environment (habitats associated with farm buildings etc.), and old varieties of cultivated plants.

The following is an account of the measures which have been or are in the process of being implemented.

The agricultural landscape

Hay meadows

An agri-environmental scheme to encourage the management of hay meadows was introduced in 1996. Its purpose is to preserve the country's remaining hay meadows, which are of great importance for the conservation of many of the management-dependent species of the farmed landscape. Meadow management is based on traditional knowledge and practices. One by-product of the scheme is that the traditional knowledge on which the meadow system is based will be passed on to a

younger generation of farmers. During the first year, applications were submitted for an area of around 4,200 ha, corresponding to management payments of about SEK 12 million.

Grazing lands

Agri-environmental support for grazing lands was introduced through the Open Landscape scheme in 1995 and the aid scheme for the conservation of biodiversity and cultural heritage values in semi-natural grazing lands in 1996. 'Older' types of grazing land, such as grazed forest land, mountain summer pastures etc., also qualify for support. In 1996 a total of around 355,000 ha of grazing land was covered by one or other of the two schemes. In all, some SEK 365 million has been disbursed to promote the management of grazing lands.

Small-scale habitats on arable land

A scheme to promote the conservation of areas with biologically rich habitats and valuable cultural heritage environments was introduced in 1996, among other things to preserve small-scale habitats such as stone walls, mid-field patches of rough ground, open ditches etc. Overall, 14 per cent of the country's agricultural enterprises have joined this scheme, and management payments of some SEK 260 million have been made. Agri-environmental support for the restoration and establishment of wetlands and ponds in the agricultural landscape was introduced in 1996. That year, applications were made for the conversion of some 1,200 ha of farmland to wetlands, corresponding to payments of around SEK 7 million. A scheme to encourage the establishment of permanent grassland on river and stream banks, with the aim of reducing nutrient leaching, was also set up in 1996. Applications covering some 1,350 ha were received, and payments of about SEK 3 million have been made.

Arable weeds and the farmstead environment

These issues are among those covered by a broad-based information campaign (see below). It is planned that in 1998, as part of the campaign, small demonstration fields will be established to show how the conservation of arable weed species can be enhanced.

Livestock

New regulations on general aspects of the design of breeding programmes for modern livestock breeds have been drawn up. Research relating to genetic profiles of endangered Nordic livestock breeds is in progress. A number of measures have been initiated, including pedigree recording, establishment of breeding plans, development of semen banks etc. In addition, an agri-environmental scheme for the conservation of local breeds under threat of extinction was introduced in 1995. The scheme currently covers 13 breeds of cattle, sheep and goats. In 1996, payments totalling some SEK 3 million were made for just over 7,600 animals.

Reindeer herding

An environmental objective has been incorporated in the Reindeer Husbandry Act, namely that reindeer herding should be carried on in such a way as to preserve the long-term productivity of natural pastures, so that a good yield is sustained, while also

maintaining the biological diversity of pasture areas. In addition, regulations have been drawn up concerning the attention which must be paid to the interests of nature and cultural heritage conservation. These limit and regulate reindeer-herding practices which could be detrimental to biodiversity.

Studies are in progress relating to special land use plans, inventory methods for reindeer pastures, and action programmes for overgrazed areas. The aim of these studies is to ensure that reindeer numbers, grazing pressure etc. can be adjusted to ensure the long-term productivity of grazing areas and the conservation of biodiversity.

Further action planned – agriculture and reindeer herding

Plans for the subsequent implementation of the Convention are laid down in the Government Bill mentioned above, and, as has already been noted, the national agri-environmental programme is a key instrument in this process. The outcome of the current review and evaluation of the environmental effects of the Common Agricultural Policy will obviously be a major factor in deciding what additional action may be necessary. If new needs emerge in terms of measures in this area, the possibility of elaborating a new action plan should be considered.

Several of the measures planned for the immediate future have been described above. In addition, mention may be made of the following actions, which are intended to be initiated in 1998:

Under the agri-environmental programme, a new scheme is to be introduced to promote the restoration of hay meadows. Its aims include improving conditions for species which are favoured by a mowing regime and which are characteristic of the different types of meadows existing in Sweden. Regarding grazing lands, the area eligible for payments will be extended to include pastures affected by fertilizer use. This will be of great significance for the biodiversity associated with the trees and shrubs on such land. It will also be possible to apply for support for ‘traditional arable land’, as part of the demonstration component of the agri-environmental programme. Land covered by the scheme will be used to cultivate and thus conserve old, local crop varieties and also to conserve the arable weed species associated with the traditional agricultural landscape (such species, like local crop varieties, are often endangered).

A new support scheme for conventional agriculture which makes sustainable use of resources is to be introduced; this scheme will include elements with effects on biodiversity. Among other things, riparian buffer zones with grass cover will be obligatory, as will a pesticide-free zone round every field in which cereals are grown. Pesticide-free zones are important in enhancing the species diversity of field margins. In addition, the agri-environmental programme will be extended to include another two livestock breeds.

Following further inquiries, special measures should be introduced to conserve natural and cultural environments in reindeer-herding areas. The education, information and demonstration programme should also include measures for the conservation of biodiversity in the reindeer-herding region.

At the international level, with regard to the regions neighbouring on Sweden, the emphasis will be on the Baltic Sea region and on efforts to improve the environmental performance of agriculture with a view to reducing the sector's adverse impacts on this sea area. One transboundary environmental problem is nutrient losses, which result in eutrophication. The agricultural sector falls within the scope of the Helsinki Convention and the work of HELCOM. In the Baltic states, Russia, Poland and other countries, Sweden has supported the dissemination of information about ways of reducing the detrimental environmental effects of farming. In addition, it has taken the initiative for an Agenda 21 for the Baltic – *Baltic 21* – in which context agriculture is a key sector. This process will result in a number of action plans, including one for agriculture. The Baltic 21 agenda is intended to be adopted at the highest possible political level in the course of 1998. Sectoral responsibility has been a fundamental principle in its elaboration.

In Sweden's opinion, the EU's Common Agricultural Policy (CAP) should be revised, with the aim of promoting environmentally sounder agriculture. An environmental goal should be incorporated in this policy, of equal status to other CAP objectives. The polluter pays principle should also apply in the agricultural sector. Payments should be made for the production of 'public goods', such as well-managed meadows and pastures with high biodiversity, for which there is a demand in society and among consumers. Sweden also intends to work to ensure that an evaluation of the effects of Council Regulation (EEC) No. 2078/92 is carried out.

6.5 Fisheries

The action plan of the National Board of Fisheries was also confirmed in 1997 in the Government Bill on Sustainable Fisheries and Agriculture. This plan is an important policy instrument and will guide future efforts to conserve biodiversity in the fisheries sector. All essential parts of it should be implemented with the aim of achieving sustainable fisheries. Efforts to develop environmental quality objectives and measurable action targets should continue and be given priority. Priority should also be given to the development of selective catching techniques, management of the wild salmon populations of the Baltic, and the conservation of certain species, such as the wels and the noble crayfish.

Action already taken or in progress can be summarized in the following points:

- Provisions on environmental impact assessment have been incorporated in the Fisheries Act. These provisions make it possible to require such an assessment prior to the exploitation of a new target species.

Freshwater habitats

- A review of water rights judgments, with a view to guaranteeing minimum flows that are sufficiently high for fish and with a view to achieving environmental improvements in regulated rivers.
- Reductions in discharges to fresh waters, to levels that do not affect fish and their food organisms. Liming of anthropogenically acidified waters.

Freshwater fish populations

- A nationwide inventory of fish communities, species, populations etc. in fresh waters.
- Implementation of the action plan for the wels (*Silurus glanis*).
- Elaboration of an action plan for the conservation of spring-spawning vendace (*Coregonus trybomi*).
- Implementation of the action plan for the conservation of the noble crayfish (*Astacus astacus*).
- More effective protection of naturally reproducing salmon (*Salmo salar*) and brown trout (*Salmo trutta*) populations in Lake Vänern.
- Establishment of a gene bank for fish species/populations which are particularly valuable in genetic terms; cryo-preservation and a living gene bank.
- A review of existing legislation, with a view to reducing the risk of expansion of species/populations of fish and other organisms not native to the country or region. Restrictions on compensatory and enhancement releases of hatchery-reared fish, in favour of restoring conditions conducive to natural spawning.

Marine fish populations

- A description of changes in biological diversity.
- Development of selective catching techniques.
- Development of methods and models for estimating populations.
- Removal of fishing gear lost at sea, and development of methods to find such gear.

Freshwater and marine fish populations

- An international action plan to conserve the wild salmon of the Baltic Sea has been adopted by the International Baltic Sea Fishery Commission and is to be implemented at the national level.
- An action programme to conserve naturally reproducing salmon populations along the west coast of Sweden is being developed.
- A gene bank for the 14 remaining natural salmon populations has been established.
- Regulation of fisheries to ensure that fish populations are conserved, harvests are kept within the maximum sustainable yield, and there are no adverse effects on genetic variation.

Further action planned – fisheries

Alongside the implementation of the action plan, greater resources are to be devoted to improving fisheries conservation (an increase of SEK 20 million in 1998). In the first instance, priority will be given to action to conserve threatened species and populations, habitat conservation measures, the establishment of fishery conservation areas, and stricter supervision.

Most of the measures proposed in the Board of Fisheries' action plan will be implemented over the three-year period 1996–98. Where implementation has begun according to schedule, the measures concerned will be fully implemented in line with the action plan. For various reasons, chiefly a lack of resources, there have been delays in the introduction of certain measures. In these cases it is difficult to determine whether the action concerned will be implemented and, if so, whether its completion will be delayed.

Planned measures on which a start has yet to be made include:

- An inventory of undisturbed (sub-)catchments.
- An inventory of barriers to migration.
- An inventory of damaged watercourses and lakes which would be suitable for restoration.
- A project to identify freshwater habitats supporting nationally red-listed species, with a view to introducing special protection for them.
- A project to identify freshwater habitats supporting genetically unique fish populations, with a view to introducing special protection for them.
- An inventory of species and populations of conservation value in coastal waters.

In most cases, the aim is that the action in question should be taken by the end of 1998. This target date will be met, unless implementation is delayed for some reason. In a few cases, implementation will continue beyond the end of the three-year period.

Sweden's efforts at the international level, both within the European Community and in other international forums, will be guided by the principle of sectoral responsibility for preventing and reducing adverse impacts on the marine ecosystem. We will emphasize the need to achieve long-term ecological sustainability in fisheries. In the process of reviewing the EU's Common Fisheries Policy, Sweden will be taking active steps to ensure that the objective of long-term sustainable fisheries is achieved and that environmental objectives are taken into account and developed. Efforts in this direction should be guided by the precautionary principle and the ecosystem approach decided on by ministers at the North Sea Conference in spring 1997. An encouraging development is the fishing industry's growing interest in and commitment to addressing the environmental issues which exist in this sector.

6.6 Physical planning

The action plan put forward by the Swedish Board of Housing, Building and Planning was confirmed in a Government Bill presented in 1997. The plan constitutes a valuable contribution to conserving biological diversity in the framework of physical planning and development.

The action plan proposes measures in the areas of legislation/guidance, infrastructure, urban nature and research. Under the legislation/guidance heading, the proposals on guidance to municipalities' planning departments have been implemented. There is now a good basis for a high degree of awareness among those involved in physical planning. In the area of infrastructure, the sectoral agencies concerned are assuming a substantial responsibility for conserving biodiversity, in line with the action plan's proposals. In particular, this is true of the National Road Administration.

So far, the proposed measures on better management of urban natural areas have only been implemented to a limited extent. Under the programme for ecologically sustainable development (see 6.1 above), it is possible to apply for funding through local investment programmes for projects involving the re-creation of habitats. The proposals on research have not yet been able to be carried out.

One proposal in the action plan concerned measures to compensate for losses of natural assets resulting from development projects. This proposal has been examined more closely and may possibly result in a statutory requirement (enshrined in the new Environmental Code) that such losses be assessed and compensated for in conjunction with major development projects. If implemented, the proposal will impose a duty on developers to compensate for all encroachments on protected areas, and also for encroachments on other areas containing features of particular environmental value if they entail 'a significant loss of environmental assets'. Compensation should primarily be provided by the developer creating new environmental assets; or, failing this, by ensuring that a corresponding area is protected and managed (and providing funding for this purpose). However, implementation of this proposal must not result in permits being granted for development projects if they would have been refused on other grounds. In short, care must be taken to ensure that the proposed system does not lead to less stringent assessments of the permissibility of projects and the suitability of their location.

An important basic principle in Sweden is that physical planning is regarded as an integral part of environmental policy. It is a means of preventing environmental problems, for example by ensuring appropriate siting. Alongside the action plan, therefore, the role of municipalities' strategic structure (comprehensive) plans in environmental protection has been strengthened, not least with regard to maintaining biodiversity. Among other things, there are now stricter requirements concerning *basic data* for use in elaborating these plans, e.g. regarding greenspaces and 'green structure' in urban areas. The planning and building legislation now stipulates that planning must promote an appropriate structure of greenspaces, among other things.

Further action planned – physical planning

The Board of Housing, Building and Planning is continuing to provide guidance to local authorities concerning the management of urban biodiversity. The Swedish Biodiversity Centre is involved in work of a similar nature. As part of a project entitled 'Towards sustainable development – environmental objectives and indicators in physical planning', the Board and the Environmental Protection Agency are involved in a joint development exercise focusing on physical planning and structural issues. The project, which receives some of its funding from the EU's LIFE instrument, is centred on the national environmental objectives and the role of physical planning in achieving them. Geographic information systems (GIS) and indicators of various types are the tools that are being tested in this project.

In addition, the elaboration of structure plans in the country's municipalities will be developed to enable these plans to play a greater role in the conservation of biodiversity. This is an ongoing process of change and development. In this context, mention should also be made of Local Agenda 21 activities (see 4.3).

6.7 Research relating to biodiversity

A relatively wide range of research on the conservation and sustainable use of biological diversity is being carried out at Sweden's universities and other research establishments. The Government has made certain new funding commitments over the

period 1996–98, while other areas of environmental research have had to prioritize more carefully within reduced or unchanged budgets. Special commitments have been made to research designed to promote ecologically sustainable production in agriculture and horticulture, and in forestry. These commitments include work on the conservation of genetic diversity and genetic resources.

In the view of the Government, taxonomic research should be stepped up as part of the overall effort to promote biodiversity. Work in that area should be more clearly linked to ecological and technical research, among other things with the aim of enhancing our understanding of the distribution of biodiversity, the ways in which it is affected by human activities, and what these factors entail in terms of our efforts to achieve sustainable use of natural and genetic resources.

As from 1998, a special research foundation (the Swedish Foundation for Strategic Environmental Research, MISTRA) is taking over the funding of environmental research from the Environmental Protection Agency. An assessment of how this will affect biodiversity-related research will only be possible when the current process of defining priorities has been completed. MISTRA already supports research on sustainable use of natural resources, e.g. in agriculture and forestry, and some of these programmes include components relating to biodiversity. The Foundation has also recently initiated a research programme on sustainable development in mountain regions, which incorporates biodiversity issues.

Biodiversity research is conducted at several universities and other higher education establishments around the country, mainly with outside funding, and at a few sectoral bodies such as the Forestry Research Institute (SkogForsk) and the laboratories of the National Board of Fisheries. In collaboration with the Environmental Protection Agency, the Swedish Biodiversity Centre serves as an interface for a number of different research networks.

The Council for Forestry and Agricultural Research (SJFR) and the World Wide Fund for Nature (WWF) are also significant sources of funding for biodiversity research. The Environmental Protection Agency's *Action Plan on Biological Diversity* defines 49 areas of research which are important in maintaining biodiversity in Sweden, ranging from genetic variation in individual species to policy instruments and monetary quantification of biodiversity. A survey carried out in 1996 showed that 45 of these areas were being funded, but in the case of 12 areas future funding was regarded as uncertain. One such case is research to develop indicator systems for measuring biodiversity, which has for a couple of years been funded by the Environmental Protection Agency. This project area focuses on indicators for use in nature conservation planning and environmental monitoring in the forest landscape, and may be expected to serve as a model for similar systems for use in other environments.

6.8 Education and awareness

Education and the dissemination of information about biodiversity should be a broad-based undertaking, involving the environmental authorities concerned, schools and universities, the business sector and voluntary organizations. Broad cooperation enables such efforts to make an effective impact and reach important target groups. To

a large extent, education and information activities should be integrated into the sectors concerned and carried out together with sectoral organizations. Brief presentations of a number of specific projects are given below.

Sweden has set aside a total of SEK 110 million a year for education, information and demonstration projects under its national agri-environmental programme. Of this sum, an annual SEK 35 million was allocated in 1995 and 1996 to an information and education campaign on the conservation of biodiversity and cultural heritage assets. The aim of this broadly designed campaign, in which central government agencies have worked alongside representatives of the farming community, is to provide farmers, landowners and agricultural employees with the knowledge required to ensure that the biodiversity and cultural heritage of the agricultural landscape are conserved and enhanced. During the first two years of the campaign, some 36,000 people took part in some form of education or information activity and contracts were signed with around 150 demonstration farms in Sweden. As part of the campaign, a magazine, *Smultronställen* ('Favourite Spots'), is being distributed to farmers throughout the country and others.

'Noah's Express' is an exhibition on biodiversity which is currently touring Sweden. It is accommodated on board a train, and is a collaborative project involving Riksutställningar (the Swedish Travelling Exhibitions Service), the Swedish State Railways, the Environmental Protection Agency, the Swedish Museum of Natural History and others. The principal target group is schoolchildren aged 13–15. There are exhibition guides on board to look after the visitors, who are provided with a free study pack. Teachers and tutors are also supplied with material to enable them to prepare for visits to the exhibition. At the time of writing (October 1997), the train had stopped in 18 towns and been visited by roughly 350 classes. The tour will continue to new municipalities in 1998. A 12-page magazine on biodiversity has been produced, partly for use in conjunction with the exhibition. It has also been distributed, together with a poster, to all municipal libraries in the country (some 270 in all). The Environmental Protection Agency distributes a newsletter by e-mail reflecting developments in the biodiversity field.

The Swedish environmental movement as a whole is involved in a wide range of important outreach-type information activities, aimed at both organizations' own members and the general public.

The Government has highlighted the importance of special information and education efforts relating to the introduction of alien species. Environmental authorities, sectoral agencies, sectors and organizations all need to disseminate information concerning this problem area.

6.9 International development cooperation

At both the standard-setting and the operational level, Sweden is actively seeking to promote a clear environmental and sustainability dimension to international development cooperation. One of the objectives of our development cooperation programme is to promote sustainable use of natural resources and protection of the environment. The conservation and sustainable use of biological diversity are one

important component of this goal. The Government's communication to Parliament on 'Sweden's international cooperation to achieve sustainable development' describes the tangible guidelines that are to govern future efforts on both a multilateral and a bilateral basis. Decisions on priorities are to be guided by the overarching objective of combating poverty. To promote sustainable development, it is above all essential to integrate environmental considerations in all activities.

Regarding *multilateral development cooperation*, Sweden is emphasizing, on the World Bank's Board of Executive Directors, that strong local involvement is essential if adequate attention is to be paid to the environment and sustainability. A policy dialogue with borrowing countries is important in ensuring that the Bank supports countries' own efforts in the area of biodiversity. Sweden has also stressed the importance of safeguarding the environment not only by means of special projects or components which specifically promote environmental protection, but also at the macro level, in the Bank's structural adjustment lending. It may be necessary to develop strategies and action plans for the conservation and sustainable use of biological diversity, but it is also necessary to reduce any adverse impacts of planned reform programmes in this respect.

Another way of promoting the protection of the environment and biodiversity has been to take account of the findings of environmental impact assessments at as early a stage as possible in the World Bank's country strategy process. Recent evaluations conducted by the Bank have highlighted the importance of incorporating such findings at the right point in time.

Concerning more targeted multilateral projects to promote biodiversity, Sweden has supported the Global Environment Facility (GEF) since it was created. Between 1994 and 1997, Sweden was a member of the GEF Council and actively sought to ensure that the GEF established itself as an important player in multilateral efforts to achieve the objectives of UNCED, not least in the framework of its particular mandate with regard to biodiversity. This work is continuing in the constituency group to which Sweden belongs, and which is currently represented on the Council by Finland.

Bilateral development cooperation is guided by the same principle as all the other development cooperation supported by Sweden, i.e. that environmental protection and sustainable development should in the first instance be promoted as an integral part of all projects and programmes. The basic concern of this development assistance is to eradicate poverty, in connection with which account also needs to be taken of the environmental and development problems of cities and the modern sector. Priority is being given to action in a number of areas of particular importance in achieving sustainable development and promoting biodiversity: freshwater management, agriculture and forestry (including soil conservation), the coastal zone environment and the urban environment. The main instrument used in this context is support for capacity- and institution-building in a broad sense. In the annual funding document issued to the Swedish International Development Cooperation Agency (Sida), the Government has the possibility of broadening Sida's responsibilities in this area.

In 1996, Sida adopted an Action Programme for Sustainable Development. Its basic principle is that environmental issues should be integrated into Sweden's development

assistance activities, in accordance with the undertakings that follow from the country's endorsement of, *inter alia*, Agenda 21 and the Convention on Biological Diversity. Development assistance should:

- help recipient countries to identify and implement activities which protect and conserve their natural resources and environment,
- give prominence to and support long-term sustainability,
- be guided by the principle that prevention is better than cure, and
- enable recipient countries to plan on a longer time-scale.

This has the following consequences:

- Environmental factors must be taken into account both in the overall development analysis and in analyses of countries, sectors and projects.
- Sweden should refrain from supporting projects which obstruct sustainable development.
- Environmental thinking and environmental dimensions must be integrated into the work of all of Sida's departments.

The action programme identifies a number of priority areas for environment-related activities over the next few years: water resources, sustainable agriculture and forestry, including soil conservation; the marine environment; urban environment issues; and environmentally sound energy consumption and production.

These overall principles directly affect the way biodiversity issues are handled in Sweden's development cooperation programme.

Guidelines on activities relating to biodiversity

The conservation and sustainable use of biological diversity constitute one of the areas given priority in bilateral development cooperation. In 1994, a set of strategic guidelines were adopted for work in this area, laying down among other things that:

- Impacts on biodiversity should be analysed and taken into account in all programmes and projects in all sectors.
- Sustainable use of biodiversity should be an integral part of Sida's programmes and projects in the natural resources sector.
- Sweden should give priority to support for sustainable use of biodiversity in areas used by people for productive purposes.
- Attention should focus on the local needs of poor people – who are directly dependent on agriculture, forests and aquatic resources – and local control of biodiversity should be actively supported.
- Selective support should be given to specific projects involving, for example, capacity-building and methods development.

In addition, Sweden should cooperate with other donors and non-governmental organizations and follow international developments in this area.

These guidelines have subsequently been given more tangible substance. As a result, particular emphasis has been placed on the following areas:

- General intellectual property rights issues, including the CBD's relationship to other international agreements, such as the WTO TRIPS Agreement and the FAO Undertaking on Plant Genetic Resources, and also a joint project involving the

World Bank (IBRD/ESDAR), the International Centre for Food Policy Research (IFPRI) and Sida/SAREC.

- Agrobiodiversity, plant breeding (including exchanges between institutional and traditional/local plant breeding) and seed production in relation to intellectual property rights issues, and the consequences for agricultural and rural development and food security.
- Research, methods development and capacity- and institution-building in the above areas. Priority is also given to support for NGOs, with the aim of creating scope for debate and dialogue.

Implementation

Sweden is seeking primarily to support processes and to work through various organizations and other actors – international and regional organizations, as well as national authorities, research institutions and NGOs.

Since the Convention on Biological Diversity came into force, Sida has consciously sought to integrate biodiversity issues into all its activities, rather than to increase its support for narrow biodiversity projects. The principal tool in achieving this integration is environmental impact assessment.

In the natural resources sector, particular weight is being attached to issues concerning the sustainable use of components of biodiversity. Biodiversity has a prominent place in many projects relating to agriculture, forestry and the marine environment, above all integrated with production issues, but also in the form of specific projects.

As regards methods, Sweden has placed a great deal of emphasis on capacity- and institution-building efforts aimed at authorities and research establishments. Priority has also been given to the opinion-forming and information activities of NGOs.

Bilateral activities focusing on biodiversity

Examples are given below and in Appendix 1 of projects and organizations in the area of biodiversity which Sweden is currently supporting, together with an outline of internal planning and policy development work over the last five years. Within Sida, the main departments directly involved in biodiversity projects are Natural Resources and the Environment (NATUR) and Research Cooperation (SAREC).

In general, Sweden's development cooperation programme seeks to establish collaboration with a wide range of partners in the South. In the biodiversity field, this cooperation encompasses both international bodies – including the Consultative Group on International Agricultural Research (CGIAR) and the United Nations Food and Agriculture Organization (FAO) – and regional organizations, such as the SADC Plant Genetic Resources Centre (SPGRC). National authorities and non-governmental organizations are also supported. A major commitment with regard to genetic resources policy and property rights issues is a joint project involving the World Bank, IFPRI and Sida.

Agriculture

Sweden has focused attention on agrobiodiversity issues in a variety of contexts. Since UNCED in 1992, we have sought to harmonize efforts at the policy level (FAO, CBD/COP) with the experience gained from specific programmes and projects supported by Sweden. Priority has been given to plant genetic resources and gene banks (including the work of the SPGRC in southern Africa), plant breeding and seed production, and intellectual property rights issues; this is quite natural, given the close links between these areas and agricultural production and food security.

Forestry

Forestry-related biodiversity is being supported through a number of projects, including the development of methods for local and sustainable use of tree and forest resources through the FAO-based Forests, Trees and People Programme. Funding is being provided for several research projects on the ecology and management of indigenous forests, with a focus on the management and regeneration of dry forests. This research is being carried out at several levels, international as well as local. Support for agroforestry – cultivation systems which combine trees and agricultural crops – is helping to enhance the biodiversity of the farmed landscape.

Marine environment and coastal development

Sweden's bilateral marine programme focuses on integrated coastal zone development. Coral reefs are one important specific area within the programme. Knowledge advancement and international activities are supported through several channels, including the World Resources Institute and the International Centre for Living Aquatic Resources. Other commitments in the marine sector include ongoing research projects on coastal zone ecosystems and mangroves, with the emphasis on East Africa.

Non-governmental organizations

A range of environmentally oriented NGOs, both major international organizations and smaller local ones, are receiving support for policy work, capacity-building and opinion-forming.

Internal policy development

A significant amount of work is being done within Sida to elaborate strategies and guidelines reflecting environmental conventions signed by Sweden, and to develop methods for integrating environmental issues, including biodiversity, into day-to-day activities. In this connection, internal training on environmental issues for all of Sida's staff plays an important role.

In 1995/96, Sida also carried out a broad-based study on food security in eastern and southern Africa, which serves as a complement to the Action Programme for Sustainable Development and the guidelines on biodiversity-related activities mentioned earlier.

7. Financial resources

As earlier chapters have made clear, Sweden is seeking to implement the Convention on the basis of integrating biological diversity into the policy areas and sectors concerned. It is extremely difficult therefore to estimate the total sum being devoted by central government to the conservation and sustainable use of biodiversity. The expenditure involved is spread over several government ministries and 'expenditure areas'. What is more, it is often incorporated in larger expenditure items and allocations, for example alongside funding for other environmental measures or more production-related appropriations.

The task becomes even more difficult if we attempt to estimate the resources invested in biodiversity by research establishments, municipal authorities, different economic sectors, non-governmental organizations etc. For example, the changes that are being introduced in forestry to make it more sustainable and the rules on day-to-day nature conservation measures contained in the forestry legislation mean that substantial costs are being borne by the forestry sector itself. The same is true – although the sums involved may not be as substantial – in the agriculture, fisheries and reindeer-herding sectors.

A few examples of resources allocated to biodiversity in the *central government budget* are set out below. All the figures relate to the 1997 budget, unless otherwise indicated. As has already been made clear, these figures do not give a comprehensive picture of the funds being devoted to this purpose.

Expenditure area specifically relating to environmental protection

The Swedish state budget for the financial year 1997 totals SEK 677,541 million (all expenditure areas). One area of expenditure (out of a total of 27) which is of importance for biological diversity is 'General environment and conservation', which has a total budget of just under SEK 1,330 million. Important allocations for biodiversity within this expenditure area include:

Framework allocation to Environmental Protection Agency	SEK 355 m.
Environmental monitoring	SEK 94 m.
Liming of lakes, rivers and streams	SEK 130 m.
Safeguarding natural areas of conservation value	SEK 217 m.
Research on the environment and low-waste materials cycles	SEK 135 m.
Certain areas of international environmental cooperation	SEK 41 m.

Most of the allocation devoted to safeguarding natural areas of conservation value (primarily national parks and nature reserves) benefits biodiversity, although such areas are protected for other reasons, too, such as their recreational or geological interest. The sum shown includes grants from the EU's LIFE fund (an estimated SEK 25 million). Freshwater liming is now carried out primarily with the aim of conserving biological diversity, and the whole of this appropriation must be regarded as benefiting biodiversity.

The other allocations set out above are intended for environmental protection efforts in general, and obviously biodiversity is a major aspect of those activities (see in particular chapter 3). The Environmental Protection Agency's framework allocation, for example, pays for the maintenance and management of protected areas (approx. SEK 75 million) and for work relating to threatened species (just under SEK 4 million). The allocation for environmental monitoring funds is covering the monitoring programme in its entirety and some other expenses. About 66 million SEK is used for actual environmental monitoring; it is hardly possible to estimate how large a proportion of this is of relevance to biodiversity. It should be noted that only the framework allocation can be used for staff costs at the central level (in addition to serving the purposes just mentioned).

The research allocation is intended for all environmental research, including research relating to low-waste materials cycles ('ecocycles'). As was noted earlier, as from 1998 this allocation is being discontinued and the majority of funding for environmental research is being taken over by a research foundation (MISTRA). Here, too, it is difficult to estimate what proportion of the total can be said to be directly or indirectly beneficial to biodiversity. An earlier estimate by the Environmental Protection Agency showed that, in the 1992/93 financial year, roughly SEK 65 million (1992 prices) was spent on biodiversity-related research, including funding from all sources. The great majority of this work was believed to be at the species and organism community levels (SEK 25 million and SEK 16 million, respectively).

The allocation for 'Certain areas of international environmental cooperation' includes, among other things, the cost of Sweden's contributions to international environmental conventions and agreements, meetings and processes within the UN system, and environmental cooperation under the auspices of organizations such as the OECD, the UN ECE and the Council of Europe, and relating to the Arctic region. A large proportion of this cooperation touches to a greater or lesser degree on the subject of biodiversity.

Sectorally integrated resources in other expenditure areas

Several major items of expenditure relating to biodiversity are to be found in the expenditure area 'Agriculture and forestry, fisheries etc.'. The largest item is the Swedish agri-environmental programme, set up under the EU's Council Regulation (EEC) No. 2078/92 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside. This programme has a total budget of SEK 1,050 million, of which around SEK 420 million is being used to promote biological diversity (chiefly by supporting management of semi-natural grazing lands and meadows). Just over SEK 200 million is devoted to the conservation of cultural heritage values (payments which in many cases also favour biodiversity). For further details, readers are referred to the case study on the Swedish agri-environmental programme.

Another expenditure item, amounting to just under SEK 24 million, relates to 'Environmental improvement measures in agriculture'. The purposes of this allocation include reducing nutrient leaching, increasing the proportion of agricultural production based on organic methods, and conserving biodiversity.

Regarding forests, there is an important item in the form of SEK 20 million for small-scale habitat protection and nature conservation agreements (the whole of which promotes biodiversity).

A special allocation for damage caused by wild animals amounts to SEK 12.5 million. These funds are disbursed according to the general principle that, in the first instance, such damage should be avoided by preventive action. Some of the money is used for damage by totally protected species of mammals and birds (hunting of which is not permitted, even for control purposes). Another allocation, of SEK 24 million, provides compensation for reindeer killed by predators. This money is distributed to the reindeer husbandry districts concerned by the Swedish Sami Parliament. A further SEK 5 million is spent on special inventories of predatory mammals (wolf, wolverine and lynx) in reindeer-herding areas. All of these allocations should be regarded as costs to society which relate to the country's populations of wild mammals and birds.

In the area of fisheries, 1998 will see a substantial increase (SEK 20 million) in resources for fishery conservation measures (see 6.5).

It is very difficult to give an overall figure for support for biodiversity in the framework of Sweden's development cooperation programme. This is because biodiversity forms an integral part of broader projects and programmes, above all in the area of natural resources. The total sums are not fixed either, varying from one year to the next depending on overall Swedish policy priorities. The figures given below are based on the sums actually allocated for 1995/96.

If only projects more or less *directly* concerned with biological diversity are included (gene banks, seed programmes, plant breeding, nature conservation), the total is an estimated SEK 100 million a year (not including the Global Environment Facility). This does not include the broad-based bilateral natural resources programmes in the agricultural, forestry and marine sectors (apart from those directly concerned with seeds, for example). 'Green' development assistance, with the ultimate aim of promoting the conservation and sustainable use of biodiversity, accounts for an estimated 10–12 per cent of the bilateral aid budget, which in 1997 came to almost SEK 12 billion.

8. Monitoring and evaluation

The present status of and trends in biodiversity in Sweden are described in detail in the country study (*Biological Diversity in Sweden – A Country Study*). The latter also deals with the various factors affecting and posing a threat to biological diversity. Since the country study in its entirety is being attached to this national report, these matters will not be dealt with in the present chapter. Instead, it will provide an overview of environmental monitoring of relevance to biodiversity and of Sweden's work in the areas of indicators, statistics etc.

8.1 Overview of biodiversity monitoring in Sweden

Sweden's environmental monitoring system is divided into a national core programme, managed directly by the Environmental Protection Agency, and regional programmes, managed by county administrative boards within frameworks laid down by the Agency. In addition, a significant amount of monitoring is carried out by regional air quality and water conservation associations, funded by various actors responsible for pollutant emissions. When environmental monitoring programmes were first developed, the emphasis was on monitoring various chemical threats and their effects in the environment, particularly on natural resources of significance for production and health, such as commercially valuable forests and food fish. Less attention was paid to the effects of agriculture and forestry, tourism and other types of land use, i.e. factors which have very major impacts on biodiversity. Even where large-scale monitoring of biological variables, such as freshwater and marine plankton and benthic fauna, is undertaken, the variables and sampling sites chosen are not optimally geared to indicating trends in biodiversity. In the case of certain habitat types containing high diversity, such as wetlands and mountains, virtually no biodiversity monitoring is being carried out.

The Environmental Protection Agency's *Action Plan on Biological Diversity* proposes a range of measures to make environmental monitoring a more effective tool for tracking trends in biodiversity. As a basic strategy, it proposes that priority be given to monitoring at three 'levels':
1) Extensive monitoring of habitats – distribution, structure and degree of disturbance by environmental threat factors. A combination of remote sensing and random-sample monitoring in the field ('ground truthing') is proposed.
2) Monitoring of the important species and species groups found in the different habitats, primarily in conjunction with the random checks in the field mentioned above.
3) Specific monitoring programmes for individual species and groups of species, e.g. predatory mammals.
A total of 28 different measures are proposed. For financial reasons, however, only a relatively small number of these have been implemented or seem likely to be implemented in the next few years.

Existing environmental monitoring programmes of major significance for the

monitoring of biodiversity

- Monitoring of the agricultural landscape, based on 20 reference areas.
- Monitoring of forest vegetation within the Soil and Vegetation Survey, an ongoing inventory coordinated with the National Forest Inventory.
- Monitoring of small rodents in three reference areas.
- Monitoring of freshwater benthic fauna and fish.
- Monitoring of marine plankton, soft-bottom macrofauna, bottom areas with vegetation cover and fish.
- Population estimates of the white-tailed eagle (*Haliaeetus albicilla*) and three seal species.
- Monitoring of the bird fauna by means of breeding bird surveys and migratory and wintering bird censuses.
- The Swedish CORINE Land Cover project (beginning autumn 1997).

It is very important to extend Sweden's environmental monitoring system to enable it to meet more effectively existing needs in terms of biodiversity, not least in view of the provisions of Article 7 of the Convention. The surveillance requirements of the EU's Habitats Directive, relating to both the distribution and status of natural habitats and the status of populations, are an additional reason for considering the possibility of developing a more ambitious system of national biodiversity monitoring.

8.2 Sweden's work on indicators, assessment criteria and statistics

Sweden is actively involved in a number of processes and projects to develop environmental indicators. Mention may be made of the OECD, the European Environment Agency, Nordic environmental cooperation and Baltic Sea cooperation (Baltic 21). Sweden has also participated in the 'Helsinki process', one of the aims of which is to develop indicators of sustainable use of forest resources.

In our view, indicators relating to biodiversity, including sustainable use, should be developed *as an integral part of the process of elaborating environmental indicators generally*. This is because biological diversity – and its status – is linked, directly or indirectly, to other areas of environmental protection. If biodiversity is considered in isolation, there is a risk that these links will be overlooked. Sweden's efforts to tackle major problems such as acidification and eutrophication, and nature conservation measures in the form of site safeguard, are examples of other areas of relevance to biodiversity. The link is even clearer when it comes to indicators of sustainable use, for which a sectorally integrated approach is necessary.

In the framework of Nordic environmental cooperation, a report was published in 1997 on indicators of the state of the environment, based to a large extent on the OECD's earlier work on indicators. The report is structured according to the Pressure–State–Response approach or further developments on it. A chapter on biodiversity discusses the following indicators:

- Total length of roads per unit of land area (pressure)

- Changes in the most important factors affecting selected ecosystems (pressure)
- Threatened and vulnerable species (state)
- Area of selected ecosystems (state)
- Area/proportion of protected areas (response)
- Area of selected ecosystems protected as a proportion of the total area of protected areas (response).

These indicators must be regarded as very rough yardsticks. They are of only limited use in national efforts to monitor the status of and measures to promote biodiversity. In short, they are not sufficient to describe or monitor the status of biological diversity. Similar conclusions are drawn in a report published by the European Environment Agency in 1996, for which Sweden had editorial responsibility.

Sweden, like most other countries, currently lacks a well-developed system of biodiversity indicators. It is very difficult to define indicators which say anything in general terms about biodiversity and its present status. Indicators must be adapted to national or regional needs and designed in such a way as to be functional with regard to forest, marine and other subsets of biodiversity. In practice, it is impossible to describe every component of biological diversity. We need to have tools (in this case, indicators) which allow simplifications. These indicators cannot say everything about the state of even a limited ecosystem, and they should be taken as what they are – indicators, neither more nor less.

Sweden has a tradition of monitoring the state of the environment using indicators, although the parameters measured cannot always properly be called indicators. Examples include commoner species of different taxa, the amounts of dead wood present (monitored in the National Forest Inventory) and benthic fauna (used in freshwater monitoring programmes).

In recent years, the Environmental Protection Agency has provided special funding for a research project on indicators of biodiversity in the forest landscape (see 6.7), with a view to improving and strengthening monitoring of forest areas.

Indicators should be designed so that they are truly appropriate for the conditions and contexts they are to be used in. International cooperation should focus on *guidelines and criteria* for the development of indicators. Sweden will continue to participate in international collaboration in this area, in parallel with national efforts to develop indicators. In future there needs to be a greater focus on conditions at a national level. Among other things, it is important to link indicators to national monitoring of progress towards environmental goals and to needs in terms of statistics in various contexts. Work at the national level will focus on indicators designed to
- monitor the state of the environment,
- monitor progress towards national environmental objectives, and
- monitor the environmental protection efforts of different sectors.

The development of biodiversity indicators will form an integral part of this work.

Maintenance of biodiversity a cornerstone of sustainable development

Sustainable development and sustainable use represent a vast area in terms of evaluation and monitoring. A good deal more development work relating to the

biodiversity dimension of sustainable development will be necessary if satisfactory monitoring and evaluation are to be possible. It is therefore important to see the elaboration of indicators of biodiversity and sustainable use, for example, as part of the process of developing indicators of sustainable development.

Assessment criteria – a valuable tool in environmental protection

Assessment criteria should be seen as a tool which can assist in the interpretation of data on the state of the environment, obtained for example from environmental monitoring programmes. They facilitate overviews and comparisons between geographical regions and make it possible to demonstrate changes over time (e.g. linked to action taken). In Sweden, assessment criteria are currently being developed *inter alia* for forests, the farmed landscape, the marine and coastal environment, and fresh waters.

In the process of elaborating assessment criteria, it has not been entirely easy to handle biological diversity – or indeed biological parameters in general. Chemical and physical parameters are often easier to quantify than biological ones. The same difficulty exists as regards land-use factors (different types of physical disturbance) with impacts on biodiversity. However, the assessment criteria being developed will carry the process forward with regard to biodiversity, too.

Biodiversity in environmental statistics

Statistics are of course another valuable tool in monitoring environmental protection efforts and environmental conditions. The Environmental Protection Agency has proposed a system of official statistics on the state of the environment, in which biodiversity constitutes one fundamental component. In line with its overall approach to implementing the Convention, Sweden has chosen to handle data on biological diversity as an integral part of its environmental and natural resources statistics. Biodiversity-related statistics are therefore being (or will be) compiled by other authorities responsible for statistics, too, e.g. integrated with forest, fisheries and agricultural statistics.

The Environmental Protection Agency is currently carrying out a review to determine what data sets are needed to monitor implementation of objectives. Similarly – in line with the principle of sectoral responsibility – the other sectoral authorities have a responsibility to review their action plans and consider what data sets are required for monitoring and to produce statistics. The National Board of Fisheries, for example, is responsible for statistics on the problem of bycatch, the National Board of Forestry for statistics on links between biodiversity and forestry practices, and so on.

In general, the measurement of biological diversity requires substantial investments of resources. As is the case when objectives are to be defined and biodiversity is to be monitored, statistics will often focus on the *determinants of biodiversity*, rather than on biodiversity (the variability of genes, species etc.) *as such*. Swedish state of the environment statistics follow broadly the same ecosystem-based structure as is used in environmental monitoring. Statistical variables of relevance to biodiversity are thus included under the headings ‘forests’, ‘marine environment’ etc. In 1997 the Environmental Protection Agency has further developed state of the environment

statistics for fresh waters and forests; in 1998 this work is intended to continue with regard to the marine environment and the agricultural landscape.

8.3 Evaluating progress towards objectives

Monitoring implementation of the action plans

In the first instance, the sectoral action plans cover the period 1996–98 (although some objectives and measures must be viewed in a longer time-frame). The primary responsibility for implementing and monitoring the implementation of each action plan rests with the individual authority concerned. The environmental authority (the Environmental Protection Agency) has a special responsibility to monitor and evaluate both environmental protection efforts and the state of the environment. As yet, progress towards the objectives proposed in the sectoral action plans has not been evaluated.

Evaluations so far of progress towards objectives

At the request of the Government, the Environmental Protection Agency has carried out a number of reviews of implementation of environmental objectives, several of which relate to biological diversity. However, no specific evaluation of progress towards goals in the area of biodiversity has been undertaken.

In relation to both the forestry policy decision and agricultural policy, major projects are under way to assess to what extent the associated environmental objectives have been achieved. Regarding the environmental objective incorporated in Sweden's forestry policy, the National Board of Forestry and the Environmental Protection Agency will be presenting a joint progress report at the end of 1997. Even at this stage, however, the following findings may be noted:

- The scale of drainage operations in forests has decreased appreciably, largely owing to stricter regulations.
- Felling is still being carried out on too large a scale in forest habitats known to support threatened species or species requiring special care. A study shows that felling has taken place on around 500 such sites in the last three years. On the other hand, planned harvesting operations have been stopped in around 1,200 such areas.
- Significant areas of productive forest land have already been set aside for nature conservation purposes on a voluntary basis, serving as an important complement to statutory nature reserves and small-scale habitat protection.

Biodiversity in the farmed landscape has been monitored as part of an overall evaluation of Sweden's agricultural policy. With the help of field documentation, the parameters of most importance for biodiversity have been tracked. A final report on this project was presented in November 1997.

It has not been possible to monitor in general terms (for all ecosystems, species and genetic variation) progress towards the overarching policy objective for biodiversity (see 5.1). One *example* of a review of implementation of this objective concerns Sweden's '*warmth-demanding' deciduous forests* (i.e. forests with a defined minimum proportion of certain species of broad-leaved trees, namely ash, beech, elm, hornbeam,

lime, maple, oak or wild cherry) and their biodiversity. For this habitat type, the objective can only be achieved by a combination of measures:

- protection and management of the most valuable warmth-demanding deciduous forests in terms of biodiversity (site safeguard),
- action by the forestry sector to maintain the total area of such forests,
- use of silvicultural methods better suited to the habitat requirements of species and populations,
- small-scale habitat protection, nature conservation agreements and advisory services, and
- action (national and international) to reduce emissions and deposition of atmospheric pollutants, particularly nitrogen and sulphur compounds.

The review concluded that:

- The general goal of maintaining the *area* of warmth-demanding deciduous forest has been achieved. However, this is not sufficient to preserve the diversity of species associated with these forests, since these species are heavily dependent on features found in natural forests.
- An action target calling for the area of protected warmth-demanding deciduous forest to be doubled by the year 2000 looks likely to be met.
- The reduction targets for sulphur emissions have been achieved. The corresponding targets for nitrogen oxide emissions, on the other hand, have not been met (for Sweden as a whole).
- Inputs of airborne pollutants to warmth-demanding deciduous forests, in southern Sweden at least, are still well above the critical loads defined for sulphur and nitrogen.

At the time of the review, monitorable objectives concerning habitat protection, nature conservation agreements and advice to the forestry sector had not been defined.

To sum up, it may be noted that assessing progress towards the overall biodiversity objective is a complex business. One valuable lesson that has been learnt is that, to make it possible to monitor its implementation, this objective must be broken down into more specific goals for different ecosystems or habitat types, constituent goals concerning different phenomena or areas of action. The actors that have to play a part in achieving objectives are often to be found in different sectors (in the above example, forestry, nature conservation, sectors responsible for acidifying emissions, and others). This is true not only of the biodiversity associated with this particular type of forest, but also of other components of biodiversity.

System for monitoring progress towards objectives now being developed

Reviews of the implementation of environmental objectives and studies on the general approach of ‘management by objectives’ in the area of environmental protection have highlighted a number of problems surrounding the design of environmental goals. The conclusions drawn are also relevant to goals for biodiversity:

- objectives are rarely expressed in quantifiable terms,
- target dates for achieving them are often not defined,
- it is often unclear to whom they are addressed,
- the actors concerned do not perceive the objectives as their own and consequently feel no responsibility for achieving them, and
- it is often difficult for lay people to understand the meaning of objectives.

In the course of the autumn of 1997, the Environmental Protection Agency has presented proposals to the Government concerning new, revised environmental objectives and a system to monitor progress in achieving them. Biological diversity is dealt with as an integral part of these proposals. The monitoring system will gradually be developed and should create an appreciably better basis for tracking progress towards environmental goals.

Red-listed species an important measure of the overall situation

The situation as regards nationally red-listed species is described in detail in the Swedish country study. There are an estimated 55,000 species in all in Sweden. Within the groups of organisms which have been evaluated so far with respect to their present status and the threats to them, a total of some 3,500 species have been included on Sweden's national Red Lists. Of these, just over 1,400 are threatened in the sense that the long-term survival of viable populations is not assured (the Endangered and Vulnerable categories). More than 200 are classed as Extinct in Sweden.

Considered together, the national Red Lists constitute an important basis for assessing the status of biological diversity. They say a great deal not only about the situation at the species and population levels, but also about what has happened and is happening at the habitat and ecosystem levels, since, in general, the commonest threat factor is habitat destruction or an erosion of habitat characteristics that are vitally important to many species. The patterns that emerge from an analysis of the Red Lists, particularly with regard to threat factors and habitat requirements, give a good indication of why the situation is as it is. For example, the lists include some 1,950 of Sweden's forest-dwelling species, and almost as many species associated with the agricultural landscape. In short, the Red Lists are extremely important as indicators of the overall situation in different ecosystems and within groups of organisms. Obviously, the lists express the more or less precarious situation which each individual species concerned finds itself in. It is important to emphasize, though, that the Red Lists *as such* cannot be used to decide priority species for species-based action. In discussions on such priorities, attention should be paid to *all species*, not just to those that are red-listed, and a range of different factors need to be taken into account.

Sweden's overall objective is to maintain viable populations of all naturally occurring species. In the light of the national Red Lists, it has to be said that at present we are a long way short of that goal. In all probability, natural factors – such as natural changes in climate – make only a very marginal difference to the situation regarding red-listed species. Consequently, vigorous action – targeted on both habitats and individual species – needs to be taken in different sectors and areas in order to improve the situation and move closer to the objective.

How does the national situation with respect to red-listed species compare with the situation beyond Sweden's borders? By way of an example, a number of researchers at the Swedish University of Agricultural Sciences and the Forestry Research Institute (SkogForsk) have carried out a more detailed analysis of the country's red-listed *forest species* from an international point of view. Although there are gaps in the data available, particularly concerning the global distribution of a number of forest species, it would appear that Sweden is home to very few species which are regarded as

endemic to Scandinavia. There are also relatively few species which have more than 10 per cent of their European distribution range in Sweden (roughly 15 per cent of the approximately 1,500 red-listed forest species). Scandinavian endemics and species with over 10 per cent of their range in Sweden are to a large extent to be found in coniferous forests, with a smaller number associated with warmth-demanding deciduous woodlands.

If *all* red-listed forest species are taken into account, on the other hand, a different picture emerges: warmth-demanding deciduous forests then stand out as the most important forest type. The deciduous forests of Europe have been decimated by forestry and urbanization, and now only small areas of a reasonably natural character remain. Only around 2 per cent of the original area of nemoral forest in central Europe, for example, survives in a more or less natural state. Situated as they are outside the major industrial centres of Europe, the oak, beech and other broad-leaved forests of southern Sweden are less affected by air pollution than those of central and western Europe. From a European point of view, therefore, Sweden's remaining warmth-demanding deciduous woods of a natural character stand out as being of even greater value.

9. Experience and conclusions drawn during the early stages of implementation

This chapter consists, first, of a section describing Sweden's general experience and conclusions and, second, of a number of case studies providing examples of early efforts to implement the Convention.

In the framework of Nordic environmental cooperation, Sweden, together with Finland, Denmark and Norway, has been involved in a project designed to promote an exchange of experience relating to implementation of the Convention, and in particular relating to sectoral responsibility and sectoral integration in that context. The conclusions drawn from this project provided a valuable input to the present chapter of Sweden's national report. So, too, did an evaluation of implementation carried out by the European Environment Agency in 1997.

9.1 General experience and conclusions

Sectoral responsibility and integration – the right approach, but still a long way to go

The principle of sectoral responsibility and of integrating efforts to promote biodiversity in the various relevant sectors is without doubt the right approach. The core idea of sectoral responsibility is that the sector or actor that creates or contributes to a problem also holds the solution to it. It is a question of changing the sector's activities in such a way that they help to achieve, rather than obstruct, the objectives set. Sectoral responsibility has come a comparatively long way as far as biodiversity is concerned, particularly in agriculture and forestry. Significant changes in a positive direction have taken place in recent years.

However, a good deal remains to be done before the principle of sectoral responsibility and a sectorally integrated approach can be said to be operating entirely satisfactorily in the area of biodiversity. The following is an account of some of the lessons learnt in Sweden so far.

Clarifying what sectoral responsibility means

The principle of sectoral responsibility needs to be clarified, for example in terms of *the meaning of the concept, the division of roles and responsibilities which it entails* and *reporting requirements.* At the same time, it is important that every sector (including both sectoral authorities and the sector itself) is given an 'independent' responsibility for its share of implementation; that sectors themselves are entrusted with formulating necessary sectoral goals, measures and so on.

Some actors outside the official sphere have found – and perhaps still do find – the division of responsibilities unclear, particularly between the Environmental Protection Agency and the relevant sectoral agencies. Who is actually responsible for what? And how far does sectoral responsibility really extend, for example in terms of funding the

action needed in a given sector, or the measures required because of the adverse impacts of past activities in the sector?

A not uncommon misconception has been (is) that responsibilities are directly linked to specific ecosystems. For example, that the National Board of Fisheries is responsible for the aquatic environment; the National Board of Forestry for all biodiversity in the forest landscape; and so on. In actual fact, of course, the biodiversity of aquatic environments, for example, is a shared responsibility, since it is affected to a greater or lesser extent by a wide variety of sectors. Sectoral responsibility and the division of roles associated with it means, rather, that each sector is expected to make its own activities environmentally sounder, so as to minimize their detrimental effects on biodiversity.

One valuable aspect of the process of drawing up action plans was that the sectoral authorities were given *separate, independent terms of reference*. It was clear from the outset that the Board of Agriculture, the Board of Fisheries, the Board of Housing, Building and Planning and the Board of Forestry were each being asked to consider *themselves* what objectives and actions were needed in their respective sectors to ensure that those sectors promoted, rather than obstructed, the aims of the Convention. Each authority also had to accept responsibility for the resulting plan – for example, to defend the measures proposed or respond to criticisms about specific goals and/or measures being omitted. All these factors helped to ensure a positive approach to the task in the sectors concerned. The proposals came from the sector itself – not from 'the outside'. This is an important psychological factor in the process of achieving sectoral integration: with increasing responsibility and delegation of powers, different actors grow, take steps to enhance their knowledge and skills, and so on. A positive attitude to the tasks to be undertaken is a fundamental factor for success in sectoral integration.

Another type of clarification regarding sectoral responsibility relates to the needs which exist in a given sector in terms of research and other activities to add to the existing stock of knowledge (in this case, concerning biodiversity). Sectors should themselves see to it that these needs are met and consequently assume responsibility for funding, too. This is also true of the development of new knowledge relating to sectors' impacts on biodiversity.

The environmental authority, too, should seek to develop and improve its performance, in this case in its role as an overarching, coordinating agency. It should have the overall responsibility for describing and evaluating the state of the environment, and hence the state of biodiversity. In particular, it has an important part to play in describing and analysing the *combined results* of all the action taken. For example, marine biodiversity is affected by a wide range of activities (on land and at sea). It is the combined effect of all the detrimental impacts and the beneficial measures undertaken which will determine the outcome in terms of biodiversity. In addition, the environmental authorities should have a *coordinating* responsibility for both environmental monitoring and research.

Shared perception of the existing situation is crucial

It is a well-known fact that different actors can perceive reality in different ways. Different views can be obtained by observing a phenomenon from different angles. Obviously this is true of biological diversity, too. All the same, it is crucially important that the different key players perceive the existing situation – in this case the present state of biodiversity – in broadly the same way. If different parties are to be able to move on to discuss what objectives need to be set and what action needs to be taken, a common platform is almost essential.

From the very beginning of the implementation process, Sweden has sought to involve the sectors most immediately concerned. It was therefore important that the country study – which describes what biological diversity exists and how it has been affected up to the present day – was drawn up jointly by the environmental authority (the Environmental Protection Agency) and the sectors in question (represented by their respective sectoral agencies). The process was not entirely painless. It turned out that in some cases views differed as to what the 'existing situation' really was. The very *process* of producing the country study – and the action plans which followed – can be seen as half the battle. Useful experience was gained from it. Everyone who was involved gained new insight and knowledge, and a greater degree of consensus was created between the different parties concerned; a good foundation was laid for the work that lay ahead.

Differing outlooks are hardly a problem that can be solved once and for all. What is important is that the process is designed in such a way as to permit different perceptions of the existing situation to be tested one against another, to allow arguments to be examined, and so on. This establishes a sufficiently good foundation and enough common ground to discuss the most important thing of all: how to solve the problems of losses of biodiversity which the different parties have together identified.

Interaction between sectoral agency and sector

Interaction between sectoral authorities and the private players in the sector concerned is another important issue. Clearly, the action plans set out the *authorities'* thinking and proposals, not those of the sector itself. Normally, however, a sector consists primarily of the people and organizations involved in its economic activities (forestry, agriculture, fishing, reindeer herding etc.), while the sectoral authority is no more than a representative of central government. Efforts to gain the support of sectors themselves for any proposals are extremely important and must be given time. Sectors must also feel that they themselves have room for manoeuvre, that they can and should play a part in implementation by taking various initiatives of their own. In particular, this can and should be achieved by means of initiatives which will be implemented in the arena of the market. One example of this is the proposal negotiated for a Swedish standard for environmental forest certification under the auspices of the Forest Stewardship Council (FSC). This standard has been negotiated by representatives of a broad range of interests e.g: forest owners. environmental organizations, the Sami community, trade unions and consumers (representatives of furniture manufacturers/retailers).

As was noted earlier, there have been many encouraging developments as regards sectoral responsibility in recent years. Up to now, however – partly for natural reasons – the emphasis has been on the role of official bodies in the implementation process, and on action initiated by political decisions. However, implementation is not the responsibility of the authorities alone. The involvement of the private sector – enterprises and individuals – is of course a key to success. In general, the private sector should be involved even more, and more effectively, in efforts to promote biodiversity.

Broadening of sectoral responsibility

Environmental responsibility in the area of biodiversity could be broadened, so as to encompass all relevant sectors and sectoral agencies (in line with Article 6(b) of the Convention). Companies, authorities and individuals should all shoulder their responsibility for protecting the environment and biological diversity. The Government has decided that consideration to biodiversity issues are to be integrated into further sectors, including energy, transport and tourism.

Important not to lose sight of cross-sectoral issues

There is clearly a danger of losing sight of cross-sectoral issues and problems if sectoral integration and a sectoral division of responsibilities are pursued too far. A sectorally integrated approach requires a great deal of coordination and exchange of information between sectors; there need to be cross-sectoral forums in which a broader discussion can be maintained. As was mentioned earlier, in many cases the environmental authorities have a natural responsibility for coordination. This does not entirely solve the problem of cross-sectoral issues, however. Two such questions are genetic resources and the Convention's provisions on access to them; and the problem of the introduction of alien species. These are issues which quite clearly cut across sectoral divides, both within the Government and between authorities and different economic sectors. How should coordination be achieved? Who should have overall responsibility?

Sustainable use – more precise definition important

The Convention's definition of sustainable use (Article 2) is of some help – but not all that much when we get down to the level of implementation on a national basis and in different sectors. The definition needs to be more precise and the concept further developed.

This can most appropriately be done within each sector or industry. *Criteria* of sustainable use should be established and monitorable objectives relating to these criteria should be defined. The next step is then of course to translate these objectives into tangible action programmes with the aim of changing the sector concerned in the direction of more sustainable use. The sectoral action plans drawn up in Sweden are an initial step in this direction.

The standard for environmental certification can be regarded as a good example of an attempt to define criteria for sustainable forestry. The criteria which it lays down flesh out the concept of sustainable use in such a way that it can be applied directly in forest

management. The development of criteria of sustainable use should be seen as an ongoing process; reappraisals will be necessary as new knowledge emerges.

'Threshold values', expressed in terms of critical loads, critical limits to land and water use and critical levels of habitats, populations etc., may need to be defined.

Sustainable use fundamental to achieving sustainable development

Sustainable use of biological diversity – with the aim of maintaining biodiversity in the form of genes, species and functioning ecosystems over time – is a fundamental criterion of sustainable development. Within the 'environmental' dimension of sustainable development, this is one of the most important criteria of all.

All in all, a great deal of development work (and also research) still needs to be carried out to impart more tangible meaning to the watchword 'sustainable use'. Some of this work should be done within sectors. At the same time, there are aspects which are clearly general and cut across sectoral boundaries, which means that the environmental authorities, too, have an important responsibility in this context.

Monitorable objectives crucial in tracking and evaluating progress

As has already been pointed out, the principle that production objectives and environmental goals – including those relating to biodiversity – should carry equal weight is a cornerstone of Swedish environmental policy. Politically determined objectives placed on an equal footing are important as a basis for the subsequent definition of goals within sectors and at lower geographical levels (e.g. counties and municipalities).

The *Strategy for Biological Diversity* attaches great importance to defining objectives for biodiversity in such a way that it is possible to monitor progress towards achieving them. Experience to date tells us that this is often difficult, but by no means impossible. The criteria of 'monitorability' which have proved most difficult to meet when developing objectives are:

- objectives should be expressed in terms of some measurable unit (number, area, weight etc.),
- there should be a defined target date for achieving them.

Objectives often focus on determinants of biodiversity

The Environmental Protection Agency's action plan presents a model for the ongoing process of developing objectives. It is based on a simplified – but necessary – subdivision into the three levels of ecosystem, species and genetic variation. Very simply, the idea is to define parameters or variables which are of particular significance for biodiversity in different ecosystems, e.g. seas, fresh waters and forests. These variables perhaps do not always reflect biodiversity *as such*, but refer rather to *determinants* of biodiversity. Such variables could include chemical and physical characteristics of aquatic environments (e.g. alkalinity and pH) or dead wood as a crucial habitat for many forest organisms.

When objectives are being elaborated, it is often necessary to generalize; a goal may for example express a minimum or maximum level which a parameter must not fall

below or exceed, or an average value which should apply over the country as a whole, but with scope for local and regional deviations. Most experience of defining monitorable objectives has been gained in the area of nature conservation, for example in relation to site safeguard. Here, goals are usually expressed in terms of establishing special protection and management for x hectares or y per cent of a given habitat type. Things immediately become more difficult when objectives are to be developed concerning the general state of the countryside, such as fragmentation of the landscape or the distance between and size of habitats.

Goals relating to species and populations could be important to adopted. It can be noted, though, that it is not practically feasible to do so for more than a limited number of species/populations. In Sweden, objectives of this type are primarily defined when action programmes for particular species are drawn up. The great majority of biodiversity in the form of species and genes has to be captured by objectives relating to factors which are generally significant as determinants of biodiversity.

Development of objectives an ongoing process

A great deal remains to be done as regards developing operational, monitorable objectives. This is true in the area of environmental protection as a whole, but perhaps the biggest challenge exists when it comes to biodiversity. The sectors concerned still have a long way to go in terms of adopting sectoral objectives referring to important parameters relating to their activities. Goals may for example need to be defined concerning bycatch problems in the fisheries sector, the degree of fragmentation of the forest landscape (primarily linked to the forestry and infrastructure sectors), or leaching of nutrients from farmland (agriculture). A fundamental requirement is that the actors affected by such objectives – the people who have to help achieve them – also feel a sense of *involvement* in them.

The various sectors have a long-standing tradition of developing production-related goals and targets. It should be remembered that sectoral responsibility for the environment is a relatively new phenomenon (going back around 10 years). It is necessary to create new traditions and develop partly new expertise. In the environment protection 'sector', too, there is of course still work to be done. One major need – not least at the county and municipal levels – is to adapt national objectives to regional and local conditions.

Biological diversity a difficult concept – needs to be operationalized

'Biological diversity' is of value as an umbrella term for what, at a simplified level, can be called the variety and variability of all living things on earth. As such, it has, in a relatively short time, exerted a far-reaching political influence, from the global to the national and – in some cases – the local level. Although the phenomena included in the concept – species, genes, ecosystems etc. – are very tangible, the concept *as such* is hardly very tangible. It has many facets; different actors sometimes attach differing meanings to it. One important fact that has emerged is that many people regard biodiversity as a difficult concept to understand.

In short, 'biological diversity' needs to be made more tangible; its meaning needs to be clarified, so that it can be translated into concrete environmental protection and

planning. It must be made capable of being handled in a process involving objectives, action and monitoring of progress. This can only be achieved to a certain extent at a central level. Much of the work has to be done at the regional and local levels and in different sectors.

Generally little attention to biodiversity in Local Agenda 21 activities

Agenda 21 has had a widespread impact in Sweden, and Local Agenda 21 projects of various kinds are in progress in basically all of the country's municipalities. Preliminary evaluations of such projects, however, show that biological diversity has in general received little attention in this context. Why is this the case?

There are no doubt several reasons. A Local Agenda 21 process is supposed to grow mainly 'from below'. This means that an important question is: How does the conservation of biodiversity affect *me* – as an individual, a consumer, a local resident, a parent etc.? There appears to be a gap between national undertakings in this area (the Convention, environmental policy objectives and so on) and the everyday lives of ordinary people. A contributory reason is no doubt the fact that the concept of biological diversity as such is felt to be difficult to understand. It is necessary to demonstrate how the conservation of biodiversity does in fact affect the individual and – not least – how the individual can help to conserve biodiversity.

It may be important in this context to emphasize that biodiversity has many different values, not only economic and scientific, but also social, cultural, recreational and aesthetic (see for example the Preamble to the Convention). It should also be pointed out that efforts to maintain biodiversity are prompted not only by the individual's needs, but also by ethical considerations: questions concerning the global distribution of resources, solidarity with future generations, and ultimately ethical/moral obligations to other forms of life here on earth. Many people are committed to safeguarding nature perhaps not primarily out of an intellectual conviction about the importance of conserving biodiversity, but rather because of a deep-seated feeling for nature and all living things. This commitment needs to be turned to better account in our endeavour to implement the Convention. In short, it is necessary to bridge the gap between the articles and objectives of the Convention and the individual's feeling for and commitment to nature.

It is important that local activities are linked to the biodiversity which in fact exists locally – a much-appreciated cultural landscape of meadows and unimproved pastures, a lake, a natural forest etc. – and to local use of components of biodiversity. It is easier to make the concept of biodiversity comprehensible if it can be referred to a geographical framework, a landscape. Above all, it is important that local communities decide for themselves what they want to work on and how.

One way of ensuring that biodiversity is taken into account in the day-to-day activities of municipal authorities is to make greater use than at present of nature conservation planning, which involves compiling systematic documentation on conservation and biodiversity. This documentation of what exists in the way of valuable habitat types, species etc. in a municipality provides an invaluable input into physical planning and the municipality-wide structure (comprehensive) plan required by law. Nature conservation planning along these lines clarifies the concept of biodiversity and creates

a good basis for satisfactory physical planning. Another approach is to draw up a local biodiversity action plan (see the case study on the action taken in Norrtälje).

A major educational challenge

To sum up, it can be said that we are faced with a major and important educational challenge; in short, the challenge of public education. Just as we need to explain and describe what an ecologically sustainable society is all about, so too we must explain what biological diversity is and how it affects us all. This task is not one which central government and other authorities can undertake on their own; a wide range of different groups in society must also be involved. Sweden has a strong tradition of voluntary sector activities and adult education on which to build. Now this tradition must be channelled into addressing the major issues of the 21st century: the common task of building an ecologically sustainable society and, as part of this: why and how we should conserve biodiversity.

Variation of biodiversity in time and space – a key issue

Biological diversity varies – and should vary – in time and space. It is a dynamic phenomenon, constantly changing, as a result of both natural factors and the influence of human beings since the earliest days of civilization. This fact does not simplify the task of making biodiversity a manageable concept.

Questions which constantly recur are: What biodiversity do we actually want to conserve, and what geographical scale should we use when setting objectives? Is it sufficient to have one viable population of a certain species somewhere in the country, or should we endeavour to create conditions which will enable displaced species to recolonize their former distribution ranges? What should Sweden's managed forest landscape look like? It is hardly possible to return to a 'natural state'. Instead, we must try to create a landscape in which use of biodiversity can be combined with its conservation. There are no obvious answers as regards what such a landscape should look like. Ultimately, it will be a matter of making choices: What do we in fact want?

The variation of biodiversity in time and space – and how this variation is to be 'interpreted' in the context of developing objectives and measures – is an issue of key importance to future efforts. In many cases, a better knowledge base is called for.

Areas of particular value require special action

The Swedish strategy can be said to have two pillars: (i) measures affecting the landscape as a whole, with regard to which greater sectoral responsibility and integration are an important way forward; and (ii) measures to protect and manage areas of particular value in terms of biodiversity. This strategy makes it clear that it is not possible to achieve the objectives of the Convention simply and solely by setting up more reserves. In certain ecosystems and areas, however, diversity can only be preserved by protecting them from use, for example because they constitute the habitats of especially sensitive species. This means that there continues to be a need for action to protect and manage particularly valuable areas.

Regional and international cooperation must continue

Problems of losses of and adverse impacts on biodiversity often cut across national frontiers. Sweden shares open and semi-enclosed seas – and their populations – with other coastal states. A large proportion of our bird fauna migrates to other countries in winter. We import (and export) pollutants which have detrimental effects on ecosystems. As regards water- and airborne pollutants, it may be noted that, although the majority come from other countries, Sweden is in general the biggest individual source of the pollutants affecting its own territory. In the case of eutrophication of Swedish lakes, for example, Sweden is responsible for over 70 per cent of the total pollutant input. When it comes to pollutants causing acidification, Sweden is affected more by German emissions than by its own. The United Kingdom and Poland also play a significant part in acidification; and Denmark is of significance for eutrophication in southern parts of Sweden and the Kattegat. At the same time, Sweden is responsible for 5–10 per cent of the eutrophication observed in the Baltic Sea, for example. It is therefore of very great importance that regional cooperation continues.

As far as Sweden is concerned, environmental cooperation relating to the Baltic Sea is particularly important. Pollutant inputs to this, the world's largest brackish-water ecosystem, remain high, although some progress has been made. To a large extent, the seal populations of the Baltic must be managed on a joint basis. The unique Baltic ecosystem can only be saved if regional cooperation with the other states which share its drainage basin continues and is stepped up. The Baltic, incidentally, is a good illustration of why care should be taken not to reduce biodiversity to a mere matter of high species diversity. Because of its evolution since the last glaciation, the brackish Baltic Sea constitutes a habitat which is so special (neither fresh nor salt water) that it supports only a limited diversity of species. The species that do occur, on the other hand, have large populations. From an ecosystem point of view, though, the Baltic Sea is unique, even at a global level.

Sweden has a long tradition of involvement in Nordic environmental cooperation. The Nordic countries have similar natural environments and exhibit considerable similarities in terms of legislation and environmental policy in general. In the framework of the Convention, too, the Nordic states have engaged in valuable cooperation. Not least with regard to sectoral responsibility and integration, they have been able to learn from one another's experiences – encouraging and less encouraging.

Continuing cooperation within the EU is obviously very important in the implementation of the Convention. Sweden has been actively involved in the elaboration of a Community Biodiversity Strategy. Implementation of the Community strategy to combat acidification is another process of great significance for Sweden's biological diversity.

As regards the conclusions that can be drawn from Sweden's international development cooperation, it can be observed that the approach adopted – that of combating poverty and promoting sustainable development by integrating environmental concerns into the programmes and projects undertaken – coincides well with the Convention's objectives of conservation and sustainable use of resources.

Intense efforts are now being made to further develop and implement the strategies and action plans adopted at both the bilateral and the multilateral level.

In the long term, necessary to include costs in prices

Environmental assets – in the form of biological diversity, for example – usually have no owners and therefore do not command a price on the market. A general problem, therefore, is that costs in the form of detrimental impacts on the environment or losses of biodiversity are not ascribed any value when costs are calculated, products priced etc. As a result, economic instruments are becoming increasingly important in environmental policy.

Abolish or change subsidies with adverse impacts on biodiversity

It is very important to draw attention to the value of biodiversity in various contexts. That does not, in itself, necessarily entail putting a monetary price on diversity (or components of it). A study has recently been carried out in Sweden to establish what state subsidies – to companies, local authorities, individuals etc. – may be assumed to obstruct progress towards ecologically sustainable development. If activities with detrimental effects on biological diversity are subsidized, the result may be that political decisions exacerbate rather than prevent unsustainable use of natural resources and environmental degradation in the form of losses of biodiversity. As an important part of the process of developing ground rules for ecologically sustainable development – of which conservation of biodiversity is a fundamental criterion – it is important that subsidies with adverse environmental impacts should be changed or abolished.

The proposal in the Environmental Code for a compensation requirement is another example of an attempt to ensure that prices better reflect the costs of harmful impacts on the environment (see 6.6). The new provisions should result in developers making every effort to avoid encroaching on sensitive areas, and would thus have a preventive effect. The compensation rules will not create any need to estimate in monetary terms the cost of different forms of encroachment or expected adverse impacts. They will, on the other hand, mean that costs in the form of compensatory measures will be included in the costing of a project and hence in the price. Detrimental effects on the environment, such as a loss of biodiversity, will thus indirectly carry a price tag.

Better understanding of the link between biodiversity and other areas of environmental protection

Sweden has attempted to apply a broad approach in its efforts to implement the Convention. Traditionally, environmental protection has often been divided into pollution control – measures to prevent or reduce pollutant emissions – and nature conservation – the protection and management of natural areas of particular value.

Given the broad definition of biological diversity laid down in the Convention, the field of pollution control must inevitably be involved in the implementation process, too. The Convention has undoubtedly had a beneficial effect in that it has created a shared outlook and understanding between different types of environmental protection work. Whether action is being taken to eliminate pollutants from the Baltic which threaten the survival of the white-tailed eagle, for instance, or to safeguard the eagle’s nesting

sites, essentially it is prompted by a concern for the same biological diversity (in this case, a nationally red-listed bird of prey).

Ultimately, virtually every environmental threat poses a danger to human health and/or biodiversity. Accordingly, most environmental efforts relate to these two 'objects of protection'. Although it may be technically oriented at times, pollution control is fundamentally motivated by the fact that pollutants affect different ecosystems and their content and functioning. Some pollutants pose a direct and acute threat to biodiversity, while others represent a threat in the longer term.

Quite clearly, the Convention has played an important and beneficial role in highlighting the link with biodiversity which is inherent in the majority of environmental protection efforts.

Convention an important catalyst, but much remains to be done

The Convention has without doubt had a catalytic effect on the work being done in Sweden. Many initiatives and projects have seen the light of day thanks to the Convention and the attention which it has drawn to biodiversity. It is presumably as a catalyst for processes at the regional, national and sub-national levels that the Convention has its greatest strength. An important area in which further efforts are needed is making biodiversity a more prominent part of Local Agenda 21 activities.

A fundamental question is of course how much of this work has been carried out as a result of the adoption of the Convention and of Sweden becoming a party to it. That is a question which it is hardly possible to answer. Quite clearly, biodiversity held a prominent position in Sweden's environmental protection efforts even before the Convention was signed. The conservation of biodiversity was for example identified as one of four overall objectives of environmental policy as early as 1990. Nevertheless, the Convention and Sweden's ratification of it can be said to have brought biodiversity issues even more sharply into focus. The Convention has evidently had a powerful catalytic effect at different levels and in different areas of society. It has also brought a number of at least partly new dimensions to nature conservation efforts:

- Genetic variability is receiving more adequate attention than before. Previously, the species, habitat and ecosystem levels predominated.
- The link between *in situ* and *ex situ* conservation has been recognized.
- The linking of use and conservation has lent greater breadth to nature conservation work; traditional nature conservation is now even more clearly linked to conservation and sustainable use of resources.
- A new impetus has been given to efforts to address the problems associated with alien species.
- Discussion about the significance of biodiversity for the functioning of ecosystems has really gathered momentum.
- Conservation and sustainable use of biodiversity are playing a more prominent role in development cooperation.

Despite substantial and wide-ranging efforts, a great deal obviously remains to be done. A relatively large proportion of Sweden's species, for instance, still appear on the country's Red Lists. Although there are some encouraging signs, major and in

some cases difficult areas of action still have to be tackled. Of these, particular mention may be made of:

- Protection of areas of particularly great value in terms of biodiversity, especially Sweden's last remaining natural forests.

- Improving the status of red-listed species, to ensure the long-term survival of viable populations.

- An expansion of environmental monitoring to take better account of needs in the area of biodiversity.

- Further development of knowledge: by means of inventories, we need to find out what biological diversity exists in the country, not least in aquatic environments.

- Further development of methods to ensure long-term sustainable use of biodiversity in fisheries, agriculture, reindeer herding and forestry.

- Development of regional and international cooperation.

Naturally, it is not possible to single out a small number of universal measures which will save Sweden's biodiversity. Only by a combination of a wide variety of efforts – sometimes on a small scale, sometimes on a larger scale – can we establish a basis for maintaining our wealth of diversity of genes, species and ecosystems. What is needed, in short, is a diversity of measures and projects and, above all: a diversity of actors, each playing their part.

Case studies

Sweden has chosen to use a substantial proportion of the space in its national report to present a number of case studies. Each of these studies concludes with an account of the specific lessons and conclusions drawn from the activities in question. The topics covered by the case studies have been selected with a view to providing an overall picture of Sweden's experience – both favourable and unfavourable – of efforts to promote biological diversity in Sweden.

The case studies focus on the factors and circumstances that are of relevance in this context. As far as possible, the emphasis has been on describing different actors and/or interested parties and their roles in the process (what approaches have been taken, how different problems have been tackled etc.). Several of the studies also shed light on the question of what instruments are needed to achieve the desired results.

It is hoped that the case studies chosen will offer a balanced view of different aspects and levels of biodiversity (e.g. 'wild' versus domesticated; genetic, species and ecosystem levels etc.), and also of different sectors and geographical levels. In addition, a balance has been sought between conservation and use. A number of case studies describing development cooperation projects are also included.

The world's first national city park – the importance of safeguarding biodiversity on the urban fringe

Introduction

The majority of Sweden's population live in towns or cities. It is through natural scenery and wildlife on the urban fringe that most people experience the variety of the natural world. The chief significance of biological diversity in the urban context is that it provides people with contact with nature and opportunities for recreation. In 1995, in the municipalities of Stockholm, Solna and Lidingö, the world's first national city park was established: the Ulriksdal–Haga–Brunnsviken–Djurgården area. The aim was, among other things, to safeguard a unique array of biodiversity in the vicinity of the Swedish capital. The area is often popularly known as the Stockholm Ecopark. This case study describes how this national city park was created and the lessons that can be learnt from the project so far.

History and interest of the area

By international standards, Stockholm is a relatively small city, with only around 1.3 million inhabitants (Greater Stockholm). Thanks to its natural setting, in a fissure valley landscape with the Baltic Sea to the east and Mälaren, Sweden's fourth largest lake, to the west, Stockholm is a green, airy city, surrounded by water. Parks, other greenspaces and water form more or less distinct wedges between its built-up areas.

These green and blue wedges lend something of a basic structure to this urban landscape.

The National City Park – which is immediately adjacent to the city centre – consists of a continuous area of greenspace extending from the landward end of the Stockholm archipelago (Fjäderholmarna), via Djurgården and Haga–Brunnsviken, to the grounds of Ulriksdal Palace to the north-west. What makes the area so interesting and unique is its combination of cultural monuments of national interest, rich biological diversity of great conservation value, and significant opportunities for outdoor recreation, all in the immediate vicinity of the capital. The Park forms an important part of the 'green structure' around the centre of Stockholm.

Unique biological diversity

The area consists primarily of a cultural landscape, shaped to a large extent by its human inhabitants. Its character varies, from forests, lakes and wetlands to meadows, pastures and parks. In particular, there are large areas of old oak trees, constituting one of the largest oak landscapes in Sweden. Pedunculate oak (*Quercus robur*) can be said to be the characteristic plant species of the National City Park.

The animal and plant species of the area include several that appear on Sweden's national Red Lists. Several of them are associated with the old, coarse-stemmed oaks and with dead wood in varying stages of decomposition. These include the oecophorid moth *Dafa formosella*, the clearwing moth *Synanthedon vespiforme* and the longhorn beetle *Plagionotus detritus*, species which are known from only a few sites in Europe. The area also supports a diverse bird life, including several less common species such as goshawk (*Accipiter gentilis*), eagle owl (*Bubo bubo*) and lesser spotted woodpecker (*Dendrocopos minor*). Eight species of bat have been observed. Igelbäcken Stream is one of the few Swedish haunts of the stone loach (*Barbatula barbatula*), a small red-listed fish. A number of rare and threatened fungi and vascular plants are also to be found within the boundaries of the Park.

A historical landscape

From a historical point of view, the area can be divided into two parts: the royal hunting grounds of Djurgården and the Gustavian Park, comprising Haga Park, Brunnsviken and the gardens of Ulriksdal Palace. Sweden's kings hunted in Djurgården from the end of the 16th century, mainly for deer, but also for wolves and bears. The area fell into disuse as a hunting park in the 19th century, and since then it has served as a recreation area for the people of Stockholm.

The Gustavian Park began to be established by Gustav III around Lake Brunnsviken at the end of the 18th century. It also includes the grounds of Ulriksdal Palace, with its Palace Theatre. Another feature on the shores of Brunnsviken is the Bergius Botanical Garden, created by a follower of Linnaeus. The landscape around Brunnsviken has been preserved largely intact since the days of Gustav III.

The cultural assets of the area are thus very significant: buildings, including several royal palaces, and cultural landscapes reflecting the development of Stockholm through different periods since the 17th century.

Of great value to the inhabitants of Stockholm and Sweden

Particularly in view of its proximity to the city centre, the area is naturally of very great value to the people of Stockholm, offering excellent opportunities for outdoor recreation. In the warmer months of the year, all the parks attract a steady stream of visitors – walkers, joggers, picnickers and people taking part in kite-flying and musical events. Many visitors come here simply for a few moments' peace and quiet in beautiful surroundings, away from the noise and bustle of the city.

At the same time, the area's combination of natural and cultural features lends it an important educational function: to allow people to experience at first hand and understand a landscape and its biological and cultural dimensions. A nature study centre in the area provides educational activities for children and in-service training, above all for teachers. The National City Park has become an asset for the Museum of Natural History, too, which is located inside its boundaries. As was noted earlier, the Museum is playing a part in efforts to implement the Convention in Sweden.

In addition, the National City Park has proved to be an important asset in the marketing of Stockholm and for the tourist industry. Sightseeing tours by boat around the area are arranged every summer, and close cooperation has been established between the tourist trade and various voluntary organizations working to preserve the conservation and recreational interest of the Park.

Under threat for a long time

Because of its central location, the area has come under a great deal of pressure from would-be developers, especially in the last hundred years. A motion calling for it to be protected was consequently tabled in Parliament as early as 1913. Today, more than a third of the original greenspace has been built on and several major motorways pass through the National City Park. The general trend has been to develop a small piece of land at a time, the overall result being that, slowly but surely, the area has both contracted and suffered an erosion of its qualities.

The biggest threats today are plans for new transport routes (although these plans are more modest than earlier proposals) and a continuing expansion of the built-up area. Higher education and other institutions in the area, for example, are very keen to expand.

In the early 1990s, these plans for further development and fragmentation of the area gave rise to a strong body of public opinion in favour of preserving its valuable features for future generations. WWF Sweden launched a project entitled 'The Ecopark', and an umbrella organization called the Ecopark Federation was set up. In 1995, several years of hard work by a number of environmental organizations bore fruit when Parliament decided to designate the area as Sweden's (and the world's) first National City Park (*nationalstadspark*). This form of protection is in a sense a parallel to the familiar concept of a national park, in that the area is regarded as being of national significance and is to be cared for and safeguarded on a long-term basis, for the benefit of the entire population of the country and of future generations.

The area is protected under a new provision in the Natural Resources Act, which, in somewhat simplified terms, stipulates that new building or engineering projects may not be undertaken if they encroach on a park landscape or natural environment or harm the natural or cultural assets of the area in any other way. It is precisely this *combination* of ecological, cultural-historical and social and recreational features which forms the basis for designation as a national city park. Social and recreational values are often a function of cultural-historical and ecological values. Additional criteria for designation are that the area must be located in the vicinity of a town or city, be largely undeveloped, and consist of an interlocking network of park landscapes, natural environments and built environments. Biological diversity and ecology, in other words, constitute *one of several* basic criteria.

Conclusions and lessons learnt

Cooperation between different conservation interests important

In the National City Park, as in Sweden generally, we find a substantial proportion of the area's biodiversity in a landscape moulded largely by human activities, or, to put it another way, in a landscape with a history. To understand why a certain range of biological diversity is present, it is often necessary to understand the landscape in which it is found. This is particularly clear in the National City Park, since we are concerned here with a landscape consisting largely of parks and segments of 'nature' strongly influenced by people.

It is precisely these interlocking values – ecology, cultural heritage and social values – which constitute the strength of the area. To a large extent, the conservation interests concerned are catered for by separate laws and authorities, and have their own traditions and values. The National City Park combines these interests in a natural way. What is involved here is not *just* biological diversity or *just* cultural history, but a spectrum of values which many people perceive to be important and worth preserving. Accordingly, in the campaign that preceded the establishment of the Park, a wide variety of voluntary organizations were able to work together under a single umbrella and with a common aim: to protect the area from further development. These organizations had differing concerns, ranging from environmental protection and nature conservation, through horticulture and outdoor recreation, to culture. What they all had in common was their local link with the area.

The efforts to establish the National City Park have no doubt brought with them a greater understanding of and respect for these different values and their interdependence. There is for example a strong link between the insects living in the old oaks and the management methods used for several hundred years in the old royal hunting park.

Many actors – fragmented action

Within the National City Park, there are a large number of actors playing different parts: landowners, estate managers, developers etc. The state, for example, acts in a variety of roles: through its conservation authorities and the county administrative board, as a developer, and as an estate manager for the area's higher education

establishments. Other key players are of course the municipalities concerned and the Royal Djurgården Administration, which manages Djurgården (the royal hunting park).

The creation of the National City Park has undoubtedly improved coordination between the different actors in the area. A group has for example been set up to discuss management issues, under the chairmanship of the county administrative board.

Important to conserve biodiversity on the urban fringe

An opportunity to present exclusive biological diversity to the general public in the vicinity of a major city is of very great value. A comparatively large proportion of Sweden's population (roughly 15 per cent) live in Greater Stockholm. An area such as the National City Park therefore plays a very important role in enabling large numbers of people, particularly children and young people, to come into contact with nature. It offers opportunities for field studies and other educational activities within a reasonable distance of schools and people's homes.

There is, then, a need for protected areas containing a basic range of biological assets on the fringes of towns and cities, as a complement to more remote nature reserves and national parks with their more exclusive natural environments. This need should be seen in the light of Article 13 of the Convention concerning public education to promote understanding of the importance of conserving biological diversity. Opportunities to experience biodiversity lay a foundation for knowledge and understanding. The voluntary movement that actively campaigned for the area to be safeguarded summed up the purpose of the National City Park very effectively in three key words, which can be roughly translated as 'protect – preserve – present'.

Ability to influence public opinion decisive

Although the qualities of this area have been known for a long time, and despite earlier decisions – including decisions by Parliament – not to develop any more of it, in practice it has proved difficult to prevent its continuing fragmentation. The successful creation of the National City Park must to a large extent be ascribed to the voluntary organizations which sought in various ways to influence public opinion in favour of conserving the area.

Their ability to shape public opinion was presumably decisive in securing the establishment of the National City Park. For a time, the media, both press and radio and television, devoted a great deal of attention to the area and its conservation interest. Without a breakthrough in terms of media coverage, it is often difficult to generate public support for a cause, however worthy. The fact that the area has also assumed greater significance for the tourist trade is also important. This is not a case of purely passive conservation; the area is an asset which is being utilized in various ways, including as a tourist attraction.

Powerful threats call for powerful protection

The threats which have faced – and to a certain extent still do face – this area have often stemmed from other powerful interests in society. Previously, the authorities responsible, chiefly the municipal authorities and the county administrative board, attempted to maintain the conservation value of the area in the normal framework of

physical planning, and primarily through strategic structure (comprehensive) plans. Experience has shown, however, that this instrument is not sufficient to safeguard assets of conservation value in the face of the strong development interests that often exist in and around a major city. The pressures on remaining undeveloped land are always high, and highest of all in boom periods.

The basic concern of all planning is to strike a balance between different interests. This is particularly true of physical planning in urban areas. We know from experience that, in this balance, conservation – not least the conservation of biodiversity – does not weigh heavily enough compared with opposing interests. This has also been the case in the area now set aside as a National City Park. The municipality-wide structure plan required by law, for example, is not in itself legally binding, but is intended merely to provide guidance.

It is only when binding decisions are taken which give unequivocal backing to conservation interests, and clearly state that those interests are to be protected from harmful encroachments, that it becomes possible to safeguard undeveloped areas in the vicinity of towns and cities. In short, powerful threats have to be countered with regulations providing powerful protection. The protection given to the National City Park must be considered very strong, now that Parliament, in reaching its decision, has weighed up the various interests involved and explicitly given priority to conservation.

An important question in this context is that of care and management. As the earlier account of the features of the National City Park will have made clear, care and management are needed to ensure that they are preserved. Public access to the Park and the utilization of its potential for school and public education also require a variety of management measures. Experience makes it very clear that it is far easier to establish effective management of an area if it enjoys well-defined statutory protection.

How well protected is the area for the future?

The new form of protection involved here, integrating the conservation of cultural and natural assets and recreational and social benefits, has attracted a great deal of attention. There have also been a number of legal cases to determine whether detailed development plans for new transport infrastructure are compatible with the National City Park. The rulings given in those cases show that the protection enjoyed by the area is very strong.

Nevertheless, major threats to the valuable features of the area still exist. The number of development interests focusing on the area has in fact increased since the National City Park was established. Whether its protection will be maintained in the years to come will depend to a large extent on public opinion, that is to say, on the people who use and come into contact with the Park in various contexts. Claims on the area will no doubt continue to be made by different actors. Some of these claims could no doubt prove compatible with the values which the National City Park is intended to preserve. Other claims will in all probability conflict with the aims of the Park.

As far as the biodiversity of the area is concerned, its main strength lies in the fact that it is relatively easy to show to people – schoolchildren, tourists, politicians; in short, to anyone interested. Just as in most other situations, how effectively this diversity is

protected will depend on the strength of public opinion in favour of its conservation. Something which is unknown to the majority of people has the odds stacked against it when it comes to securing understanding for the importance of conserving it. And conversely: assets which are known to – and have perhaps even been experienced by – many people have a far greater chance of being preserved for future generations. This is the strength of the National City Park: as a 'living room' just around the corner, filled with opportunities to come face to face with both biological diversity and cultural history.

The white-backed woodpecker – a species conservation project in a critical phase

Background

The following case study focuses on a species conservation project in Sweden, concerned with the white-backed woodpecker (*Dendrocopos leucotos*). This species has become something of a symbol of nature conservation efforts associated with forest habitats, and in particular with deciduous woodlands. The white-backed woodpecker is the most endangered forest bird species in the country. This is mainly because of intensive forestry, which has resulted in a shortage of forest sites with a large deciduous component, combined with dead wood and the wood-inhabiting insects on which the species feeds. As the following account will make clear, this is a species conservation project which – like Swedish species conservation efforts generally – places a heavy emphasis on measures to conserve the habitats of the species in question.

Ecology of the white-backed woodpecker

The white-backed woodpecker has a highly specialized diet of wood-inhabiting insects and is consequently heavily dependent on deciduous trees. Even during the breeding season, when other insects are in plentiful supply, 50 per cent or more of its diet consists of wood-dwelling insects. As a result, the species requires a habitat with an abundance of substrates providing a food supply for such insects, primarily the dead and dying wood of deciduous trees. The white-backed woodpecker therefore occurs most abundantly in 'successional' forest communities, particularly in older stands of aspen (*Populus tremula*), birch (*Betula* spp.), common alder (*Alnus glutinosa*), grey alder (*Alnus incana*) and goat willow (*Salix caprea*). Nowadays, deciduous woodland habitats of this kind are found mainly in the vicinity of agricultural land, in the form of overgrown former meadows and pastures.

Even where highly suitable habitat exists, the white-backed woodpecker requires a large territory. If habitats are fragmented, it forages over a very large area. The species can be described as relatively mobile, and has a great ability to seek out attractive environments far beyond known nesting areas. Of all the forest species included on Sweden's national Red Lists, this is probably the one that requires the largest area of appropriate habitat.

The white-backed woodpecker could be regarded as an indicator of biologically rich deciduous woodland with a large element of dead or dying wood. Areas where it is found are very likely to be home to a large number of other national red-listed species, not least of invertebrates, lichens, bryophytes and fungi.

Population status

The white-backed woodpecker has a trans-Palaearctic distribution range, from Norway in the west to Japan in the east. In Sweden, its distribution is now fragmented into sparse subpopulations. Its total Swedish population in 1995 was just 20–30 pairs. The largest population, estimated at 20 pairs, is to be found in the provinces of Värmland

and Dalsland. The species used to occur in most parts of the country and appears to have been quite common in certain areas.

In Finland, the white-backed woodpecker has suffered a similar decline, and there are now (1996) estimated to be 30–40 breeding pairs within a relatively continuous area in the south-east of the country. The Norwegian population is one of the healthier ones in Europe, with at least 1,000 pairs (1995). In the rest of northern Europe, the species only occurs in the east, particularly in eastern Poland, the Baltic states (centred on Latvia), and a continuous area through Russia and Ukraine. In addition, there are several small and often locally restricted populations, e.g. in the Pyrenees, the Alps, the Apennines, the Balkans and the Caucasus.

The rapid decline of the species, chiefly in the second half of the 20th century, the fragmentation of its range into small isolated subpopulations, and its small effective population size together justify its inclusion in the Critically Endangered category in the national Red List.

Reasons for the species' decline

The decisive factor behind the decline of the white-backed woodpecker is the ever dwindling proportion of deciduous trees in the Swedish forest landscape. This trend is due chiefly to the Swedish forestry sector's very effective programme to suppress deciduous growth, implemented primarily in the 1950s and 1960s. Increasingly effective efforts to prevent and control forest fires have also played a part, in that there have been far fewer opportunities for the development of first-generation forests with a predominance of deciduous trees in the wake of fires. As a result of these factors combined, the proportion of deciduous forest over much of the species' former main range in Sweden is now very low, in many cases just a few per cent of what it used to be.

Given the species' highly specialized diet of insects inhabiting the wood of deciduous trees, and its consequent need for continuous access to large numbers of old, insect-infested trees of this kind, these changes in the forest landscape have greatly reduced the species' chances of survival.

The habitat requirements of the white-backed woodpecker – relatively open stands with an abundance of deciduous species and large numbers of dying trees – often conflict with the wishes of forest owners. A number of the silvicultural measures undertaken by them pose a threat to this bird:

- final felling of old stands with an abundance of deciduous trees,
- spruce planting in old deciduous stands,
- drainage of wet forest sites,
- cleaning and thinning of young stands with an abundance of deciduous trees, and
- replanting of spruce/pine on sites colonized by deciduous species after forest fires.

In addition, the elaboration of forestry plans for the country's privately owned forest land has often – *inter alia* through direct appeals to landowners – resulted in an intensification of forestry in previously untended and hence biologically valuable environments.

In recent years, attitudes to the presence of deciduous trees in coniferous forests have changed in Sweden's forestry sector. Many forest companies, and also individual forest owners, are now trying to re-establish a larger deciduous element in their forests. The higher prices paid for hardwood are partly responsible for this growing interest. At the same time, the greater demand for such timber poses a threat to many of the woodpecker's habitats, since it encourages harvesting in areas and stands which used to be of no commercial interest. Another general problem is that deciduous trees are felled before they become biologically mature. On the other hand, there has been a marked decline in drainage of wet forest sites, partly owing to much more stringent legislation, but also because of a trend towards greater environmental sensitivity in the forestry sector itself.

Production of wood chips for energy purposes has recently become an increasingly serious threat to the white-backed woodpecker's remaining habitats. As part of Sweden's long-term adjustment to a sustainable energy system, a substantial commitment to biofuels is planned. There is reason to fear that this could further undermine the position of this species, since there is a risk of deciduous trees being harvested for wood chips for this purpose. Another threat whose significance has increased considerably in this context is the cutting of firewood for domestic use. Elk (moose) (*Alces alces*) and roe deer (*Capreolus capreolus*) populations, which are now large in certain regions, also pose a threat. They prefer to browse on deciduous species, making it more difficult to re-establish forests with a large deciduous component on harvested sites.

Secondary threat factors include
- 'tidying' in the form of landscape conservation or restoration of old pasture landscapes,
- building and road construction projects, and
- increasing spontaneous spruce invasion of forests that were once more open and had a conspicuous deciduous component.

Natural factors too, such as competition from the great spotted woodpecker (*Dendrocopos major*) and predation by pine martens (*Martes martes*) and hawks (*Accipiter* spp.), can represent serious threats, given the small population of the species. Genetic drift, resulting in poorer vigour and reproductive capacity, is posing a growing threat as isolation increases and numbers dwindle. Several cases of inbreeding have already been observed. The white-backed woodpecker has an extremely poor competitive ability, and the fact that the most suitable forests are currently located near human settlements means that it is occasionally 'excluded' from suitable nesting trees by starlings (*Sturnus vulgaris*) and other hole-nesting species.

The White-Backed Woodpecker Project

Design of the project

The present White-Backed Woodpecker Project, which is being run by the Swedish Society for the Conservation of Nature, a national voluntary organization, was launched in 1990. Its purpose is to safeguard the long-term survival of this woodpecker species in Sweden. It has had several predecessors with the same aim. The project includes:

- monitoring of population trends,
- monitoring and mapping of the species' habitats,
- information and advice to landowners and authorities,
- information to the general public through the media and lectures,
- active habitat protection and management through management agreements, voluntary agreements and habitat improvement measures,
- supplementary feeding with suet in winter,
- gathering of data on the species' habitat requirements,
- gathering of data on the significance of the woodpecker's habitats for other red-listed species,
- international networking, chiefly in the Nordic region and with other Baltic Sea countries, and
- augmenting of populations by restocking.

The project is guided to a large extent by a landscape ecological approach. One important objective is to re-establish a larger proportion of biologically mature deciduous trees in forests. Since the optimal habitats that remain are too small for the species to survive, the project has begun to focus on recreating forests with a large deciduous element and on actively creating dead wood.

Partners

The project is being run in close collaboration with several forest companies. Cooperation has for example been established with STORA Skog AB, whereby that company has selected and delimited a hundred areas that are to be managed in an optimal manner for the white-backed woodpecker. An agreement between the Society for the Conservation of Nature and STORA Skog is intended to be signed in the course of 1997. The project also involves cooperation with public authorities, chiefly at the regional level, i.e. county administrative and forestry boards. In addition, collaboration has been established with Norwegian nature conservation bodies and with the Nordic Ark animal sanctuary in Sweden, involving the keeping of white-backed woodpeckers in short-term captivity for subsequent release in Sweden. So far, just under ten birds originating in Norway or the Baltic states have been released.

The White-Backed Woodpecker Project is also associated with another project, on the western taiga and the white-backed woodpecker, which is receiving financial support from the LIFE fund of the European Union. The purpose of this project, operated by Sweden's National Board of Forestry and Environmental Protection Agency, is to set up new nature reserves for the benefit of this woodpecker and other species.

What instruments are needed to ensure long-term survival?

The project has so far achieved a number of useful results. County plans presenting all of the core areas for the white-backed woodpecker have been drawn up, based on inventories of environments suitable for the species. The aim is that the authorities concerned, especially county forestry boards, should make active use of these plans in their conservation efforts relating to the species and its habitats (i.e. the deciduous forest sites where the woodpecker occurs).

An action programme is being elaborated. The present draft includes details of measures to be introduced, priorities, and estimates of the resources needed.

Several instruments could help to ensure that the necessary action is taken and that the long-term goal of the survival of viable populations is achieved:

• Legal/administrative instruments, in the form of reserve designation and habitat protection (under the provisions of the Nature Conservation Act) for the largest and most valuable areas. In this connection, the LIFE project referred to above will play an important part: its aim is to safeguard some 600 ha in nature reserves and to ensure that forestry is optimally geared to the needs of the white-backed woodpecker over an additional area of approximately 16,000 ha.

• Management agreements: Under the White-Backed Woodpecker Project, a form of habitat protection based on management agreements has been promoted. In areas covered by such agreements, all deciduous trees and, where relevant, 10 per cent of conifers are protected. Agreements are entered into for periods of between 5 and a maximum of 50 years, and currently cover some 240 ha. The average cost involved is SEK 520 per hectare per year. Previously, the parties to these agreements would be the Swedish Society for the Conservation of Nature and the landowner, but they are now entered into between the county forestry board and the landowner. In that the forests concerned are often of a successional type, such agreements can be at least as effective a measure as buying a site outright as a reserve.

• Voluntary agreements and undertakings: In addition to management agreements, voluntary agreements are being entered into as part of the project. These are aimed primarily at large landowners and municipalities, but also at individuals. Written agreements of this type currently exist for some 400 ha of land, mainly in Dalsland and Värmland.

Another voluntary agreement is the one signed in 1996 by the Society and STORA Skog, the Rottneros bruk pulp mill and the forest owners' association Västra skogsägarna. This agreement resulted in changes to the purchasing lists for hardwood used in the region comprising the counties of Älvsborg, Värmland and Örebro. As from the beginning of 1997, the forest industry has excluded aspen with a diameter exceeding 50 cm, goat willow, and common and grey alder from these lists.

A noteworthy example of a voluntary undertaking is STORA Skog's decision to create conditions to enable a hundred new white-backed woodpecker pairs to nest on the company's land. Areas have been selected, in consultation with voluntary nature conservation organizations, with a view to strengthening and linking existing breeding areas.

• Information and public relations: This is an important constituent part of the project. Promoting greater awareness among the general public and forest managers/owners is extremely important in securing understanding for efforts to conserve this bird species in Sweden. Advice and information aimed at small-scale private forest owners are of particular importance. The project has attracted considerable media attention, at both the local and the national level.

Funding

The project is being funded by the Swedish Society for the Conservation of Nature (project manager). Other sources of finance have included WWF (World Wide Fund for Nature) Sweden (sponsorship discontinued in 1996) and the Swedish Environmental Protection Agency. Funding for reserve and habitat protection work is being provided by the state and by the EU's LIFE fund (see above). In addition, forest companies and individual forest owners are contributing by making voluntary undertakings, as illustrated by STORA Skog's white-backed woodpecker areas. The management agreements mentioned above have mainly been financed by WWF.

Further efforts essential

Since the position of the white-backed woodpecker in Sweden is more precarious than ever, further action on a large scale is essential. By and large, continuing efforts are needed in the areas already focused on:

- Monitoring of remaining populations and inventories.
- Continued protection of the areas of greatest value.
- Elaboration of special deciduous forest plans for large geographical areas, and ecological landscape planning.
- Habitat management measures, e.g. re-establishing larger elements of deciduous trees and dead wood.
- Restocking on a limited scale to support existing populations, using birds from Norway, the Baltic states or Poland.
- Information, above all to the landowners concerned.

Conclusions and lessons learnt

Few white-backed woodpeckers in Sweden – many in Norway and the Baltic states

Why should we invest large sums of money in the conservation of a species which is admittedly disappearing from Sweden, but which at the same time has viable populations in Norway, the Baltic states and eastern Europe? Can we, and should we even, relinquish this responsibility and abandon our efforts to protect a species which does after all survive in neighbouring countries? This is a question that has figured prominently in the forestry and nature conservation debate in Sweden in recent years.

In the framework of Sweden's policy on biodiversity, it has been affirmed that every country has a responsibility for its own biological resources. Discussions about priorities, which should sometimes have a geographical horizon going beyond the country's borders (e.g. taking into account the entire range of a particular species), must 'not, however, result in Sweden relinquishing its responsibility for habitats, species or genetic variation which undeniably form part of Sweden's biological diversity'. In this particular case, moreover, the species concerned is declining across the great majority of its total range, precisely as a result of habitat destruction.

Given this clarification by the Swedish Parliament and Government, there can be no doubt about the objective: although the prospects are bleak at present, and although viable populations do exist in other parts of Europe, the aim is to create conditions which will allow viable populations of the white-backed woodpecker to survive in Sweden, too. Moreover, there is now a high degree of consensus – between the

forestry sector, nature conservation organizations and agencies, and others – concerning this objective. The draft action programme sets a long-term target of at least 200 pairs in Sweden.

Involve key players

The key players as far as saving the white-backed woodpecker is concerned are to be found in the forestry sector. It is this sector which has the 'solution' in its hands, and it is here primarily that the practical action to conserve and restore the species' habitats has to be taken. It is therefore important to inform all the landowners concerned that habitats for this woodpecker exist on *their* land, and that they need to be preserved. Additional efforts must be made in this area.

Even though the position of the white-backed woodpecker has not improved, the project must be described as a success in a number of respects. It has for example been possible to involve different representatives of the forestry sector. The first thing to be done here is of course to create an understanding of the importance of conserving this bird species. The next step is to discuss tangible action, perhaps in relation to specific forest holdings.

The agreement between the Society for the Conservation of Nature and several important actors on the timber market of the counties of Älvsborg, Värmland and Örebro (the prime area in Sweden for the white-backed woodpecker) must be seen as an important contribution to the conservation of this species. The agreement excludes – more or less – from purchasing lists the deciduous species which are of particular importance to the white-backed woodpecker. This takes away the market and significantly reduces the incentive to fell these trees. The agreement would not have been possible without the support of all the parties concerned – individual forest owners, forest companies, timber merchants and conservationists. This agreement, like the management agreements, can be regarded as an example of successful involvement of the pertinent sector in biodiversity conservation.

The forestry authorities have slowly but surely assumed greater responsibility, and cooperation with them is working well. This is fully in line with the principle of 'sectoral responsibility' laid down by the Swedish Government and Parliament for every sector of society with an impact of some kind on the environment. It is also entirely in keeping with Article 6 of the Convention.

The very fact that many actors are involved makes coordination particularly important. Species conservation is no longer the concern of nature conservation organizations and authorities alone, but also of forestry authorities, forest companies and small-scale forest owners. The key to success is securing these players' commitment to the process and persuading them all to work in the same direction.

'Flagship' species necessary

For better or worse, the white-backed woodpecker has attracted a great deal of attention in the Swedish nature conservation debate. The interest shown in 'flagship' species, however, is perhaps not always in proportion to the value of these particular species (compared with other, less conspicuous species inhabiting or growing in the

same environments). Clearly, though, the media interest in the white-backed woodpecker has focused attention on an entire habitat type: forests with an abundance of deciduous trees and dead wood. Such sites also constitute the habitat of a number of other more or less vulnerable species. Those species are thus indirectly receiving attention and help as a result of the interest in the white-backed woodpecker.

The case for saving the white-backed woodpecker, moreover, has as its basic argument the fact that an entire habitat type is disappearing from the Swedish forest landscape, and with it many other species, too. It is important to emphasize this habitat-oriented approach, since it ensures that species conservation is not viewed in isolation from the wider ecosystem context. At the same time, generally speaking, our knowledge base is still best developed at the species level; studies of species provide a basis for assessing which habitat types and underlying conditions for biodiversity are to be considered important. Ecosystem functions and processes are still relatively little understood. In short, measures to promote biological diversity, even at the habitat level, continue to be based chiefly on data about the ecology of individual species.

How much are we prepared to pay for a woodpecker?

Conservation of the white-backed woodpecker is undoubtedly an expensive undertaking, both for the public purse (the state and to a certain extent local authorities) and for the forestry sector (forest companies and individual forest owners). The species' habitat often consists of productive forest land producing timber worth substantial sums of money. Although some measures can, and should, be undertaken in the framework of existing land use and the attention which owners are required by law to pay to nature conservation, the fact remains that, in order to safeguard the white-backed woodpecker's core areas – which is absolutely essential if the species is to have a chance of surviving in Sweden – large financial resources will be needed to establish reserves and/or introduce small-scale habitat protection. Those resources may be provided either by the public sector or – and this is an important factor – by forest companies and individual forest owners voluntarily agreeing to set aside significant areas without claiming compensation (following the example of STORA Skog AB's commitment to establishing a hundred white-backed woodpecker areas).

Studies of willingness to pay show that people are in general prepared to pay to maintain viable populations of threatened species. In a study dealing specifically with the white-backed woodpecker, a majority of respondents ranked the argument 'All species have a right to exist' as the most important reason for preserving this species in Sweden. On average, Swedes were prepared to pay SEK 10 per person per year to help conserve the white-backed woodpecker. On the other hand, respondents were not prepared to pay for measures aimed at increasing its numbers beyond the smallest viable population. Awareness of the fact that the white-backed woodpecker is not endangered at a global level did not influence their willingness to pay for its conservation in Sweden. This clearly shows that people generally ascribe what is usually called an 'existence value' to species occurring naturally in their country.

In Finland, a system of guide values in Finnish marks has been established for animals and plants protected under the Nature Conservation Act. On the basis of these values, the courts determine the sums to be paid in compensation for breaches of the protection regulations. Under this system, the value of one white-backed woodpecker

has been estimated at FIM 24,000. It should be pointed out that the Finnish system is primarily to be regarded as a preventive tool (to discourage infringements of the protection provisions), rather than as an environmental policy instrument geared to ensuring the survival of threatened species.

Continuing downward trend

Despite all the action taken, despite greater efforts both by nature conservation agencies and organizations and by the forestry sector, the downward trend in the white-backed woodpecker population has continued. Why is this? One reason is that the population is already so small that demographic factors – including the geographical distance between remaining individuals and pairs – are of great significance. Another reason is in all probability the fact that remaining deciduous forest stands, which used to be unprofitable, have become commercially interesting in the 1990s. Hopefully, the agreement with the various parties involved in the timber market will be able to halt this trend. Another reason is of course the insufficient resources that have hitherto been available for the designation of protected areas. Felling has been carried out on several sites which ought to have been protected.

Project workers have attempted to estimate what financial resources are needed to conserve the white-backed woodpecker's habitat (assuming that all the areas concerned are safeguarded as reserves or by means of small-scale habitat protection). A few years ago, they estimated that it would cost at least SEK 100 million (at the prices then prevailing) to save the species from extinction in Sweden. That figure can be compared with the total resources – currently around SEK 240 million – available to the state nature conservation agencies for the protection of valuable natural assets of all kinds. However, it is hardly realistic or reasonable to expect to be able to save this woodpecker with public-sector projects and funding alone. The forestry sector also has a responsibility to contribute financially – which, as was noted earlier, it is already doing. Nevertheless, there is undoubtedly a need to further strengthen public resources to safeguard forests of value in terms of biodiversity.

Environmental certification of forestry offers hope for the future

In 1997 an agreement was reached on environmental certification of the Swedish forestry sector between the major forest companies, environmental organisations, the sami organisations and the trade unions. It is too early to say, however, how widely supported the certification scheme will be and what practical impact it will have. It is also difficult to assess at the present time what part it will play in the conservation of the white-backed woodpecker.

What is quite clear, though, is that the certification standard will make for better prospects of preserving the white-backed woodpecker's habitats. The need for reserves and similar measures to safeguard favourable environmental conditions over larger areas remains undiminished, however. Given that a large proportion of the remaining pairs of the species, and of suitable habitats generally, are to be found on land belonging to such owners. It is thus of importance to which extent the environmental certification will apeal to these forest owners.

The agri-environmental programme – production of biodiversity by grazing

The following case study describes the experience gained so far from the Swedish agri-environmental programme, focusing in particular on support for the conservation of grazing land. The study has been prepared by the Swedish Board of Agriculture.

Introduction

Agriculture has long set its imprint on the Swedish landscape. The wealth and variety of habitats present in farming areas are a crucial prior condition for species richness among plants and animals. However, developments such as structural rationalization, reduced numbers of grazing livestock, withdrawal of land from agricultural production and changes in land use have caused a gradual decline in the variability of the agricultural landscape. As a result, biological diversity has also been substantially reduced. Hay meadows and semi-natural grazing lands (unimproved pastures) were a significant feature of the old farmed landscape, but the extent of such areas is now greatly reduced. Land of these types is very rich in species and also in features of considerable cultural heritage value. Partly because of the trends described, many of the species associated with farming areas are now under threat.

Sweden's accession to the European Union in 1995 provided the country with new, powerful tools to expand and broaden the national measures introduced previously to conserve and enhance the biodiversity of the agricultural landscape.

The Swedish agri-environmental programme

Environmentally motivated support for the conservation of grazing land was introduced in 1996 as part of the Swedish agri-environmental programme, drawn up under Council Regulation (EEC) No. 2078/92 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside. Through this support, society as a whole pays for the biological and cultural assets that are created when pastures are managed using traditional methods. The same objective was pursued on a smaller scale through earlier national systems of payments for the conservation of grazing land.

The objectives of the Swedish agri-environmental programme are:

- to conserve biological diversity and cultural heritage remains in the agricultural landscape,
- to conserve the genetic resources existing in endangered livestock breeds,
- to restore and establish habitats in order to enhance biodiversity, and
- to reduce nutrient leaching and pesticide use in order to avoid health risks and create good conditions for flora and fauna.

Two agri-environmental schemes to conserve grazing land

The aim of the aid scheme for the 'conservation of biodiversity and cultural heritage values in semi-natural grazing lands' (the Grazing Lands scheme) is to ensure that the remaining semi-natural grazing lands in Sweden, with a total area of around 370,000 ha, are managed in such a way as to maintain and enhance their density and

diversity of species, their characteristic flora and fauna, and the presence of rare species typical of semi-natural pastures. At the same time, they should be managed so as to preserve and highlight their cultural heritage features, not least ancient monuments. A total of SEK 426 million a year was budgeted for this objective.

Farmers managing holdings in 'less favoured areas' can also choose to apply for payments for their grazing land under an aid scheme for the 'maintenance of an open landscape' (the Open Landscape scheme). The aims of this scheme include ensuring the continuation of extensive use of semi-natural grazing lands and other low-productivity forage areas, in order to maintain the natural and cultural heritage values of the agricultural landscape and avoid the introduction of more intensive production methods. In terms of area, the target is that some 80,000 ha of grazing land should be covered by the scheme. An annual sum of around SEK 124 million was set aside to achieve the scheme's objective with regard to grazing land.

With certain exceptions, the management requirements are the same for both schemes, but classifications and levels of payments differ. The intention was that the most valuable grazing lands would be covered by the first of the schemes and others by the second.

Definitions

Grazing land is defined as land which is used or is suitable for use for livestock grazing and which is not suitable for ploughing. Semi-natural grazing land is usually defined as, in addition, having long continuity as pasture- or meadowland, supporting a species-rich vegetation of a type favoured by grazing, and affected to only a limited extent by ploughing, fertilizer use, reseeding or any other recent measures designed to increase productivity. Alongside hay meadows, semi-natural grazing lands are the land type which accounts for the greatest biodiversity in the agricultural landscape.

Administrative procedures

The farmer applies for agri-environmental support for the management of grazing land of biological value, stating in his/her application the area of the grazing land concerned and its value according to a classification system laid down in the Swedish Agri-Environmental Programme Ordinance.

The appropriate county administrative board examines each individual application, decides whether support is to be granted and the sum to be paid, and is responsible for supervising the schemes and carrying out necessary checks. In its decision, the board can set special management conditions for grazing lands of the highest conservation interest. It is also responsible for providing farmers with information, chiefly in oral form, about the scheme.

The Swedish Board of Agriculture is responsible for central monitoring of compliance with Council Regulation (EEC) No. 2078/92. It issues regulations on how supervision and control are to be carried out and disburses all payments under the direct support schemes. Its other responsibilities include central computer processing, producing application forms and information booklets aimed directly at farmers, and dealing with

appeals. Information activities targeted on county administrative boards include courses and a series of circulars.

Take-up of the schemes

When the agri-environmental programme was developed, an important basic principle, alongside the aim of preserving the country's remaining valuable grazing lands, was that payments under the programme should become available to the producers of environmental services – the farmers – immediately after Sweden's accession to the EU. All farmers who managed pasture-land meeting certain predefined criteria could apply for support. One of the advantages of the system is that farmers themselves have to ascertain and assess what features of biological and cultural heritage value their land holds. This in itself serves an educational purpose, increasing in the long run the farmer's awareness of the assets that are to be preserved. Such an approach is also in line with the principle that the agricultural sector must fully shoulder its responsibility for the environment. In the light of experience of an earlier national support scheme, the assessment was made that an alternative approach – involving the authority carrying out field inspections of holdings before reaching a decision – would take several years to implement, and as a result that approach was rejected.

Preliminary estimates based on applications in 1996 show that, in the country as a whole, some 360,000 ha of grazing lands are covered by one of the two measures. The areas concerned are relatively evenly divided between the Open Landscape and Grazing Lands schemes. According to national statistics, some 440,000 ha of grazing lands are in use in the country as a whole.

Considering that the rules governing the Grazing Lands scheme and information material about it were finalized and distributed at a relatively late stage, that it was only after that that farmers could start to classify their pastures, and that this was the first year of the scheme, the level of take-up of agri-environmental payments for grazing lands must be regarded as good.

Education, information and demonstration projects

Under Council Regulation No. 2078/92, funds can also be allocated to education, information and demonstration projects. To increase farmers' knowledge of – and interest in and commitment to conserving and enhancing – the biodiversity and cultural heritage of the farmed landscape, an information campaign entitled 'Farmland Diversity' was mounted at the same time as the direct aid schemes were introduced. At the central level, the Board of Agriculture is responsible for its implementation, in collaboration with the Environmental Protection Agency, the Central Board of National Antiquities and the Federation of Swedish Farmers. County administrative boards are responsible for the campaign at the regional and local levels.

The aim of the campaign is to provide farmers, landowners and agricultural employees with the knowledge required to ensure that the biodiversity and cultural heritage of the agricultural landscape are conserved and enhanced. Greater interest, motivation and commitment with regard to these issues are important elements in achieving more sustainable use of the natural resources of agricultural areas. The intention is that the campaign should equip farmers and others in the agricultural sector with the

knowledge they need to take on a greater responsibility themselves for maintaining biodiversity and to help steer developments in their sector in a favourable direction.

The campaign includes courses, field study trips, individual farm management plans, demonstration farms and study circles, and during the 1995/96 financial year some 36,000 people took part. In particular, it should be mentioned that just over 4,300 farmers now have a management plan for their farms, which gives advice on how features of biological and cultural value, including those to be found in and on grazing land, should be managed and conserved. In addition, a considerable volume of regional information material has been produced.

Lessons learnt from the programme, favourable and unfavourable

Never before has so much money been allocated to schemes which pay farmers to produce biological diversity. It is reasonable to assume that, given their considerable scale, these agri-environmental schemes will do more than earlier national environmental payment systems to maintain the management and the biodiversity of semi-natural grazing lands. The schemes are also believed to be counteracting a trend towards more intensive agricultural production in the form of grazing on arable land, which is of appreciably less value in terms of biodiversity.

However, since the agri-environmental schemes were only introduced in 1996 and, for practical reasons, quality monitoring has not been carried out on any appreciable scale, it is not possible to make a full assessment of what effects they could have or have had on the biodiversity of grazing land.

A comparison carried out in a few counties with the results of the national inventory of semi-natural pastures and meadows undertaken a few years ago indicates that on average two-thirds of the grazing land classed in the inventory as being of the highest nature conservation value is covered by the Grazing Lands scheme. Up to half the applications received relate to grazing lands which were assigned in the inventory to classes I–III (highest to high nature conservation value). In addition, some of these valuable pastures are covered by the Open Landscape scheme. It is possible that some of the sites included in the inventory do not now meet the criteria of the Grazing Lands scheme. Information targeted on farmers with grazing lands of conservation value will result in further areas being included in the latter scheme.

Monitoring

It is important that the grass sward, trees etc. of a grazing area are well managed, according to traditional methods, and this will be beneficial to the majority of other features which are dependent on management. Good management is fundamental to preserving the economic, biological and cultural values of grazing land.

Checks carried out in relation to the Grazing Lands scheme during its first year have been targeted, and cannot be regarded as representative of the farms that have applied for payments under it. The results confirm, however, that applicants have found it difficult to classify and determine the area of their pastures.

As part of the monitoring effort, assessments have also been made of how grazing lands have been managed. Around two-thirds of the area was found to be well managed, while the remainder was inadequately to poorly grazed. A certain degree of scrub encroachment was noted in one-third of the area. In cases where management is insufficient, the long-term result may be a loss of biological diversity.

Problems with the scheme which could affect biodiversity

Farmers have criticized the Grazing Lands scheme for being too complicated and requiring specialist expertise to correctly classify land, partition off areas not eligible for support, and fill in the application form. The information and education campaign was launched at the same time as the aid schemes, which meant that, at the time they made their applications, many farmers lacked the knowledge they needed to correctly classify grazing lands and partition off ineligible areas. It has also emerged that certain farmers do not consider that they can meet the criteria or feel unable or unwilling to familiarize themselves with the system and have therefore chosen not to apply. Older farmers may, for personal reasons, be hesitant about entering into an undertaking that extends over a period of five years, which is the minimum period stipulated in the Council Regulation. It is claimed that active farmers may have refrained from applying since they feel very doubtful about committing themselves for five years. Farmers may be reluctant to make a five-year undertaking owing to the uncertainty of their land tenure or because they are planning to give up their farms in the near future. Grazing lands on these farmers' holdings may admittedly be appropriately managed for a number of years, but if production is unprofitable without agri-environmental payments there is a danger that grazing will be discontinued, resulting in losses of biodiversity. Changes to the Grazing Lands scheme are planned, with a view to simplifying the classification and application procedures.

Some areas of grazing land which are of value from a nature conservation point of view do not qualify under the scheme because the criteria do not take their specific features into account. This would be the case, for example, with a lakeside or seashore meadow supporting a rich assemblage of birds and other animals, but which in recent times was arable land. Such sites will still be too clearly affected by fertilizer use and reseeding, and will thus fail to meet the present system's eligibility criteria for grazing lands. As is noted below, the existing rules are intended to be changed, *inter alia* with regard to these types of land.

A discussion about 'encroaching vegetation', which the rules stipulate must be cleared from managed land, has spread the misconception that all woody plants have to be removed, or led farmers to fear that valuable trees and shrubs may be classed as encroaching vegetation when checks are carried out. In some cases, valuable tree stands have been felled to increase the proportion of sward and thus meet the scheme's sward criteria, or due to a misunderstanding of the concept of encroaching vegetation. This is of course most unfortunate, but it is not a common occurrence. As information efforts are stepped up, definitions will be clarified and misunderstandings avoided to a greater extent than at present.

Other factors affecting agriculture

Agriculture is of course affected not only by the agri-environmental schemes, but also by many other factors which could have a more marked impact on future operations. Agri-environmental aid accounts for just a few per cent of the EU's total budget for agriculture. Some of the forms of support given under the EU's Common Agricultural Policy (CAP) have aims which are clearly mutually conflicting. Many take the view that agri-environmental measures mostly serve to offset the effects of arable area payments, for example, for which there is a far larger budget.

The agri-environmental schemes' aim of preserving semi-natural grazing lands may also be undermined by falling meat and milk prices and rising fuel costs, taxes etc. These factors may make it necessary for farmers to seek economies of scale, resulting in production being concentrated in fewer farms, primarily in areas with a predominance of arable land. There has already been quite a significant shift in this direction since the Second World War. The total number of beef and dairy cattle has fallen, and the average herd size has increased significantly.

When there is a surplus of arable land, for example when cereal growing becomes less profitable, there is a risk that such land will be used for grazing, in preference to semi-natural pastures. The latter will then be grazed insufficiently or not at all, resulting in scrub invasion and a loss of biodiversity. A similar effect could also occur if high levels of support are given to forage crop production on arable land.

Semi-natural grazing lands used to be an important element in small-scale farming, involving management methods and tasks which today's farmers have neither the time nor any financial need to undertake. When these older methods disappear, the integrity of the traditional agricultural landscape is also lost. It is therefore important to draw attention to these management practices and to seek to conserve the remaining elements of this agricultural landscape in the framework of modern farming.

Grazing land often has a special history of management involving more traditional methods. Although a relatively large area of pasture is used today, management regimes are often entirely different to those that prevailed in the old farmed landscape. Greater knowledge and changes to existing rules can play a part in ensuring that grazing lands are correctly managed and thus safeguarding the survival of the specific plant and animal communities that have adapted over a long period of time to particular types of management.

Changes to the schemes

In the light of the points raised above, work is now in progress with the aim of simplifying and improving the Grazing Lands scheme. Among other things, it is to be extended to include all grazing land, the classification criteria are to be simplified, and levels of payments are to be raised. The intention is to encourage more farmers to apply for support for their grazing areas, to bring previously ineligible areas of valuable land within the scope of the system, and to cut administration, both for farmers and for the authorities. A major education and information effort, combined with careful monitoring and other forms of follow-up, will ensure that the different types of grazing

land in the country are managed in ways which are appropriate from the point of view of maintaining their biological diversity.

Funding

Half the funding for Sweden's agri-environmental support schemes and information projects comes from the EU, and the other half from national sources. Administration of the schemes is paid for entirely out of national funds.

Conclusions

- It is necessary for society to continue to pay farmers for the production of biodiversity that results from management of semi-natural grazing lands, in order to achieve existing environmental objectives.

- Education and information on biodiversity issues, aimed at farmers, are of the utmost importance in promoting an understanding of and greater knowledge about the value of semi-natural grazing lands and appropriate management regimes.

- It is too early to say whether the Swedish agri-environmental programme is maintaining the biodiversity of semi-natural pastures, although this is of course one of its aims.

Wild Baltic salmon (*Salmo salar*)

This case study deals with the remaining wild salmon (*Salmo salar*) populations of the Baltic Sea and the action being taken, chiefly by Sweden, to save these genetically unique fish resources. The study has been compiled by the Swedish National Board of Fisheries.

Background

In the course of the 20th century, the naturally reproducing salmon populations of the Baltic Sea have dwindled to alarmingly low levels. At the beginning of the century there were some 70 naturally spawning populations in the rivers discharging into the Baltic, and annual natural production of young salmon (smolts) totalled around 8 million individuals. By 1996, the number of rivers with natural salmon production had fallen to less than 30, and annual production of wild salmon smolts was down to around 350,000. What is more, several of the remaining salmon populations are so weak that they are in danger of disappearing or suffering an erosion of their genetic quality.

In Sweden, salmon continue to spawn naturally in fourteen rivers along the Baltic Sea coast, eleven of which discharge into the Bothnian Bay (Torne älv, Kalix älv, Råne älv, Pite älv, Åby älv, Byske älv, Rickleån, Sävarån, Vindelälven, Öre älv and Lögde älv), one into the Bothnian Sea (Ljungan), and two into the southern Baltic (Emån and Mörrumsån). The population situation is most serious in the smaller rivers with small salmon populations along the Bothnian Bay coast, since they have been hardest hit by overfishing.

For two to four years, newly hatched salmon remain within the spawning area of their particular population in the river concerned. ‘Imprinting’ enables them to return to the same area later in life. River-specific salmon stocks differ genetically, since down the centuries they have developed differing abilities which enable them to survive in the environments in which they grow up. In the spring, smolts – young fish that are ready to migrate – leave their home rivers to migrate to southern areas of the Baltic Sea, where there is sufficient food for them to grow to maturity. They continue to grow in the sea for a few years before returning to reproduce in the reaches of their home rivers where they once hatched out. Baltic salmon normally have a life span of 6–8 years, and spawn only once. They would be able to spawn several times during their lifetime and live to an appreciably older age (10–15 years) if the scale of the fishery in the southern Baltic were to be reduced.

The decline in the number of wild salmon stocks and the proportion of wild salmon in the Baltic has primarily taken place over a period of 50 years, which, given the species’ long life cycle, is a relatively short time. This decline is above all the result of hydroelectric schemes, damage to salmon spawning grounds by timber floating, and significant overfishing at sea, which became an increasingly serious problem up to the end of the 1980s. In addition, forestry, agriculture and wastewater discharges from other economic activities have impaired the water quality of many rivers, affecting salmon’s survival prospects during the sensitive stages of hatching and early fry

development in fresh water. Furthermore, remaining natural salmon populations have been very severely affected by a condition known as M74 syndrome.

Salmon fisheries – from traditional river fishing to marine drift-nets

Until the Second World War, salmon were mainly caught by traditional fishing methods in rivers and river mouths, and only a third of the total catch was taken by small sailing vessels on the open sea. Annual catches were stable, at around 1,500 tonnes. Technical advances in the fishing industry between the 1950s and the 1980s, and above all the introduction of efficient drift-nets, resulted in a rapid rise in the marine share of the catch.

In the 1970s and 1980s, the marine catch increased to around 85 per cent of the total, which in 1989 peaked at about 5,600 tonnes. Despite the destruction of spawning grounds by hydroelectric schemes and the adverse impacts of other human activities on natural salmon populations, expansion of the salmon fishery was able to continue, thanks to large-scale compensatory rearing of salmon in hatcheries. The large salmon stocks made commercial fishing an attractive proposition, this in turn leading to excessive catches of wild salmon. The substantial increase in the fishery resulted in many of the wild populations of salmon being severely overexploited. From a figure of around 50 per cent in the mid-1970s, the proportion of wild salmon had fallen to just 6 per cent by 1996, measured in terms of the number of smolts migrating into the Baltic.

Salmon fishing is currently carried on out at sea, along the coasts and in rivers. The marine fishery focuses on maturing salmon in the Baltic Sea proper. In this area, it exploits what is basically an entirely mixed stock, which means that both wild and hatchery-reared populations are harvested to a similar extent. Coastal fishing of stocks from the Bothnian Bay area occurs both as mature fish move from the Baltic Sea proper towards their home rivers and, as an intensive coastal fishery, in the vicinity of those rivers. As they migrate north through the Bothnian Bay, the salmon mainly follow a route along the coast of Finland, which means that Finnish catches of Swedish and Finnish salmon during the early part of their spawning migrations are of major significance for the overall level of exploitation.

Salmon rearing to compensate for hydroelectric scheme damage

The compensatory salmon-rearing programmes carried out in Sweden and Finland are another factor behind the serious population situation, since without cultured salmon the marine fishery in the southern Baltic would be unable to continue. Over 90 per cent of the salmon in the Baltic now originate from hatchery-bred fish, and since the genetically unique wild populations mix with hatchery salmon on their feeding grounds, the weak wild stocks that remain are being overfished, owing to the non-selective nature of the marine drift-net fishery.

Some 70 per cent of the total of 5 million hatchery-reared salmon smolts migrating into the Baltic Sea every year come from the Bothnian Bay area, where Finland and Sweden have stocking programmes to compensate for the damage caused by the building of hydroelectric schemes. This pronounced dominance of cultured fish makes any attempt to exploit the various natural stocks in accordance with their individual sustainable yields more difficult. In Sweden, fish caught in the wild are used as brood

stock, which means that a certain number of fish are needed every year. Because of the high survival rate in a hatchery environment, only a small number of individuals are required. This means that hatchery rearing is largely independent of the level of exploitation by fisheries. For several decades, therefore, cultured fish have formed the basis for a fishery that has seriously overexploited the wild stocks from the Bothnian Bay area in particular. This intensive exploitation has also led to a decline in the average weight of the salmon caught, from 10 kg to around 4 kg, which means that the faster-growing fish are being fished out. The large scale of the rearing programme has also resulted in a loss of genetic variation within hatchery populations.

M74 syndrome

The scale of mortality due to M74 syndrome has varied from one year to another since the disease was first observed at a Swedish salmon hatchery in 1974. For many years, it was not a serious problem, but in 1992 mortality rose sharply and in 1993 it was as high as 90 per cent. M74 mortality rates remained high up to 1996 (50–80 per cent). In 1997, however, mortality due to M74 in Swedish salmon hatcheries fell to 30 per cent (averaged over the three Swedish hatcheries where M74 is being studied). Wild salmon are probably affected as much as hatchery-reared fish, although this has yet to be proved.

Because the salmon fry hatched in 1994, 1995 and 1996 were very severely affected by M74, seaward migration of salmon smolts will remain limited up to and including 1999. The fall in M74 mortality observed in 1997 will thus not be reflected in an increase in natural production of seaward-migrating smolts until the beginning of the 21st century at the earliest.

A Swedish research programme entitled ‘Reproductive disturbances in Baltic fish’ was established in 1993. As yet, however, scientific proof of the underlying causes of the disease and the reason for the high mortality in 1993 has not been forthcoming. M74 is in all probability due to environmental degradation of the Baltic Sea, but to date researchers have been unable to demonstrate what particular environmental perturbation is causing it. The syndrome appears to be linked to a deficiency of thiamine (vitamin B_1) in female salmon/eggs, and regular immersion of eggs and fry in thiamine has been practised at Swedish salmon hatcheries since 1995. There is no means of treating wild salmon, however.

Regulation of salmon fisheries and other measures to conserve Baltic salmon stocks

International regulation

Salmon fisheries in the Baltic Sea, beyond countries’ 4-mile limits, are regulated by the International Baltic Sea Fishery Commission (IBSFC) through an annual catch quota (total allowable catch, TAC), decided on by the participating littoral states on the basis of biological advice from the International Council for the Exploration of the Sea (ICES). The quotas imposed since 1991 have been higher than those recommended, but between 1992 and 1997 the quota has fallen by around 40 per cent, from 710,000 to 410,000 salmon.

Other controls that have been introduced are a minimum mesh size (157 mm), a maximum drift-net length of 21 km per boat, a maximum of 2,000 hooks per boat and a minimum landing size of 60 cm. In addition, fishing is prohibited in the summer in order to allow wild salmon to begin their spawning migration before the fishery is opened. A resolution has also been adopted concerning a moratorium on fishing in all rivers and the waters surrounding river mouths.

National measures and regulation of salmon fisheries

The aims of salmon fishery management in the Baltic Sea are, in the short term, to avert the immediate threat of genetic erosion and, in the long term, to fully restore the reproductive potential of every river with a natural salmon population. In Sweden, the National Board of Fisheries has since 1982 been responsible for drawing up fishing regulations to protect Baltic salmon. Over the years, the Board has issued increasingly strict regulations on river and coastal salmon fisheries. The objective has been to restore natural reproduction of salmon, in particular by increasing the numbers of mature salmon ascending rivers with good spawning grounds, thereby eliminating the threat to wild salmon stocks and making full use of the potential reproduction capacity. Since 1994, basically all salmon fishing has been prohibited in natural salmon rivers and their mouths, with the exception of limited recreational angling in rivers where the population situation gives less cause for concern.

The protection given to salmon in the early summer along the coast of northern Sweden has gradually been extended, and in 1997 the coastal fishery was not opened until 18 June, by which time the majority of wild salmon had already ascended the rivers. In addition, closed areas have been established around the mouths of all the remaining natural salmon rivers, and in 1997 these areas were extended at the mouths of the most seriously threatened wild salmon rivers, the Öre älv, Rickleån, Byske älv, Åby älv and Råne älv. Furthermore, to reduce the proportion of hatchery-bred fish, a number of ‘terminal fisheries’ have been established at the mouths of three of the rivers (Gide älv, Skellefte älv and Lule älv) where fish reared for compensatory purposes are released. In these areas, fishing is permitted for most of the year, with the aim that as much as possible of the Swedish quota will consist of hatchery salmon.

In addition, Sweden’s total annual quota has been apportioned between the marine/drift-net fishery in the southern Baltic and the coastal fishery using anchored gear off northern Sweden. And in 1997 the share assigned to the northern coastal fishery was increased from 25 to 40 per cent, the allocation to the southern Baltic fishery being reduced from 75 to 60 per cent. For 1998 a 50-50 allocation of the quota is planned, with the aim that fewer wild salmon will be caught, partly thanks to a reduced marine fishery on the salmon’s feeding grounds in the southern Baltic, where wild and hatchery salmon stocks are mixed, and partly thanks to a larger proportion of the quota being taken in the form of hatchery-reared fish when the mature salmon return to the coast of northern Sweden.

In addition to the very strict controls on fishing that have been introduced, especially over the period 1994–97, the Board of Fisheries and the Swedish Environmental Protection Agency have drawn up a wide-ranging action programme, which includes the establishment of a gene bank, improvements to spawning grounds in rivers, construction and improvement of fishways, and enhancement releases of young fish.

The gene bank consists of living fish from 16 different river populations of salmon, and the aim is to have at least 500 individuals from each population. Fish are collected during different years from the entire spawning area, so as to achieve broad genetic diversity within the gene bank. The bank is maintained at three different fish farms, and now consists of a total of 4,000 salmon. In addition, there is a separate gene bank for frozen sperm from male fish. Spawning areas in northern rivers previously used for floating timber have been improved. Stones and gravel are being put back in the rivers to enhance spawning grounds and the nursery sites where newly hatched salmon fry grow up. This improvement work began in 1995 and is planned to continue until 1999. It has been estimated that it could boost production of young salmon by a factor of 1.5–2. Over the period 1990–95, new fishways were built and old salmon ladders repaired on the Kalix älv, Pite älv, Åby älv and Lögde älv. Three different types of enhancement release are being undertaken: salmon are being introduced to new areas above fishways; existing populations that are under very severe pressure are being strengthened; and salmon are being reintroduced to rivers where there used to be stocks, but from which they have disappeared for one reason or another. In the latter case, salmon from nearby rivers are used, so that they are genetically as similar as possible to the population that used to inhabit the river concerned. Enhancement programmes are not being undertaken in rivers whose populations are sufficiently healthy to recover without assistance.

International action plan 1997–2010

In February 1997, the IBSFC adopted a long-term plan to save the genetically unique salmon stocks of the Baltic Sea. The aim of the Salmon Action Plan is to ensure that, by the year 2010, at least 50 per cent of the potential production of wild salmon has been restored in every individual river within safe genetic limits, so as to achieve a better biological balance between reared and wild salmon. A wild salmon has been defined as follows: ‘An offspring of natural spawning salmon, having spent its entire life in the wild’. In principle, the plan’s objective is to be achieved by preventing the extinction of wild salmon populations and re-establishing wild populations in existing and potential natural salmon rivers. At the same time, as high a level of fishing as possible is to be permitted, and every coastal state is urged to introduce national measures to supplement the IBSFC’s recommendations.

Two very important elements in the action plan are the introduction of genetically acceptable rules on releases aimed at enhancing natural populations, and an endeavour to target fishing as much as possible on hatchery-reared fish (i.e. terminal fisheries). In principle, a terminal fishery means that, within a geographically defined area off the coast, intensive fishing for cultured fish is permitted after the wild salmon have migrated past the area concerned. Runs of wild salmon are normally earlier than those of hatchery fish.

The plan also calls for research focusing on the genetic implications of releasing hatchery-bred salmon and greater efforts to study how salmon migrate as they develop to maturity.

In addition, research on M74 is to be intensified in order to establish the underlying causes of the disease. To enable the development of natural salmon throughout the Baltic Sea area to be monitored, national and regional index rivers will be designated.

An international surveillance group has been set up to monitor implementation of the plan on a regular basis and, where necessary, to propose complementary measures. In addition, the IBSFC calls for an intensification of research into M74, and there are plans to elaborate an international research project in the framework of the action plan. In Sweden, the National Board of Fisheries has set up a national working group to carry out the measures needed to save Sweden's salmon populations. Most of the measures falling within the action plan have to be implemented over the period 1998–2003. The action to be taken includes continued protection of natural salmon, restoration of spawning areas, building of new fishways past blocks to migration, enhancement releases, annual population surveys, marking of hatchery-reared salmon, and the designation and operation of index rivers.

Conclusions

The wild salmon populations of the Baltic Sea are above all threatened by overfishing and M74 syndrome. Since 1993, however, Sweden has made a major contribution to safeguarding the future of Baltic salmon through vigorous measures to strengthen the protection of wild salmon stocks. Full implementation of the IBSFC's international action plan for 1997–2010 is essential if a significant proportion of the potential production of natural salmon is to be restored. The successful improvements introduced by Finland and Sweden in 1996–97 as regards the protection of wild salmon stocks on their spawning migrations along the coasts of the Bothnian Bay, before they enter rivers, have resulted in a substantial rise in the number of wild female salmon migrating upstream. And the establishment of terminal fisheries limited to hatchery-raised salmon can play a significant part in increasing the proportion of wild salmon in the Baltic. However, to achieve a reasonable balance between wild and hatchery salmon, it is essential that any further releases of reared salmon meet genetically acceptable criteria (it must be possible to distinguish between hatchery-reared and wild salmon), so as not to jeopardize the rehabilitation of naturally reproducing salmon populations which has now been initiated. Large-scale releases of unmarked hatchery salmon should therefore be prohibited.

The factor that will have the greatest impact on the future development of salmon populations, however, is the scale of M74 mortality over the next few years. A sharp fall in M74 mortality, which is considered likely, means that the position of wild salmon could now be about to improve rapidly, and that 1996 could be the worst year for the salmon of the Baltic. However, there will be growing differences in population status between good and poor rivers. In the best rivers, a significant proportion (more than 50 per cent) of the potential production capacity could be restored in a fairly short time (about 5 years), while the situation in some of the worst-affected rivers will remain serious. The trend for wild salmon will only remain favourable, though, if M74 does not strike abnormally severely, and since the salmon cohorts that will make their spawning migrations in 1997, 1998 and 1999 have been hit hard by M74, the results of Swedish and Finnish regulation of the coastal and river fisheries over the period 1998–99 will in principle be decisive to the subsequent development of populations throughout the Baltic Sea.

To sum up, the wide-ranging action taken in 1994–97 to rebuild and maximize the protection of the most threatened salmon populations, and the preparedness which also exists in the form of gene banks, should be sufficient to minimize the risk of further losses of genetically unique salmon populations or of any significant deterioration of their genetic quality.

Biodiversity in the Local Agenda 21 context – the case of Norrtälje

Local Agenda 21 processes are under way in basically every municipality in Sweden. The following case study outlines the efforts that have been made to promote biological diversity in the municipality of Norrtälje, as part of its Local Agenda 21 process. It has been written by the Norrtälje municipal authority. The study begins with a description of the administrative and environmental characteristics of the municipality, which forms a basis for understanding the subsequent account of its Local Agenda 21 activities.

The municipality of Norrtälje

The municipality of Norrtälje is situated some 70 km north-east of the city of Stockholm. It comprises a land area of some 2,000 square kilometres and a sea area of around 3,600 sq km. The municipality makes up the northern third of the county of Stockholm. It is sparsely populated, with some 51,000 inhabitants. Within the municipality is the town of Norrtälje, which has a population of around 16,000. The rest of the population live in smaller towns or villages or in scattered rural settlements. In the summer months, around 100,000 people make use of second homes in the municipality.

The state of the environment

Norrtälje is a municipality dominated by its coastal archipelago (*skärgård*). Islands, islets, coastal areas and the sea between them make up more than half its total area. Roughly a third of the entire archipelago area of the county of Stockholm is within the municipality's boundaries, as are one tenth of the productive shallow-bottom areas along Sweden's Baltic Sea coast. Norrtälje has a larger archipelago area than any other municipality in Sweden. The Norrtälje archipelago forms part of the unique Stockholm–Åland–Åboland/Turunmaa archipelago, which was recently nominated for inclusion in UNESCO's World Heritage List.

Within the municipality there are inner, intermediate and outer archipelago areas, with numerous islands, rocky islets and shallow bays and inlets. Seawater here is affected in particular by inputs of nutrients, and also of heavy metals. In the last 20 years, concentrations of nitrogen and phosphorus in the surface water of the sea have risen by 1–2 per cent a year, resulting in greater abundance of free-floating algae and reduced transparency. Increased quantities of organic matter have led to oxygen deficiencies and left certain areas of the seabed devoid of life. A major section of the Furusundsleden shipping lane, used by heavy ferry traffic, passes through the municipality's archipelago, and there are some 15,000 powered recreational boats in the area. The archipelago nevertheless has a very rich flora and fauna. Ängsö National Park is one of the protected areas established here.

The municipality has some 300 lakes and five major watercourses. The great majority of these lakes and rivers are naturally rich in the nutrient phosphorus. However, as a result of human influences, such as sewage discharges from towns, villages and scattered settlements and leaching from farmland, many lakes have such high nutrient

levels that they are considered to have suffered eutrophication. In addition, some 90 per cent of the municipality's lakes have had their water levels lowered to create new arable land. They are therefore subject to significant invasion by plant growth.

Thanks to its calcareous soils, the municipality is little affected by acidification, an environmental problem that has afflicted large areas of Sweden. The lime-rich environment also supports considerable species richness, and 'rich fens' are a characteristic feature of the municipality. The varying landscape of the area, which includes both farmland and forests, means that it has one of the highest numbers of breeding bird species per unit area anywhere in Sweden.

There are agricultural areas within the municipality, but most of its land surface is forested. Forest stands in an almost virgin state survive, mainly because some 75 per cent of forest land consists of small holdings owned by private individuals. Habitats for endangered species of the forest landscape are twice as common in this area as in the rest of the country. Just over 1 per cent of forest land is now protected by law, through the establishment of nature reserves, small-scale habitat protection or by other means.

A great deal of information is available about the biodiversity of the municipality, thanks to the biological inventories that have been carried out. This information is stored in the municipality's GIS-based natural environment database. Legally protected natural areas within the municipality include 39 nature reserves, a nature conservation area, and Ängsö National Park.

The Local Agenda 21 process

In the same month as the Rio Conference, a motion was put before the Municipal Council proposing that the municipality of Norrtälje should translate the Rio decisions into tangible action at the local authority level. The aim was to develop Norrtälje into a sustainable municipality in terms of natural resources. In March 1993, the motion was approved by the Council. The Steering Group for Environmental Protection was put in charge of the Agenda 21 project. It consisted of the planning sub-committee of the Municipal Executive Committee and the chairs and deputy chairs of the committees responsible for building, environmental health, public works, child day care and compulsory education, and post-compulsory education. The Steering Group was assisted by a working party made up of officials from the departments concerned. A full-time project manager was employed for a period of 2½ years.

In September 1994, a network of interested local people and representatives of organizations, authorities, companies and other places of work was established. A monthly newsletter kept network members informed of how the different component projects were progressing. The network included, for example, all the schools and school kitchens in the area, branches of the Federation of Swedish Farmers, forest companies, food retailers, adult education organizations, libraries, environmental organizations, village residents' associations, cooperative housing societies and second-home owners' associations. Its purpose was to disseminate information about all the environmental projects in progress and all the environmental ideas put forward in the municipality. By April 1996, the network comprised some 800 people.
To make use of the ideas, comments and questions that were forthcoming, in September 1994 an Agenda 21 database was set up, in which the views etc. submitted

were entered, arranged by subject area. The database was intended as a simple means of collecting together the various ideas, but one which offered the possibility of processing the information received. In October 1995 a draft Local Agenda 21 for Norrtälje was drawn up. It was based on the 550 entries in the database, the municipality's earlier environment protection programme, and the municipal authority's compilation of the most important decisions taken at Rio and by the Swedish Parliament, the County Administrative Board and the Municipal Council.

As part of the project, eleven evening meetings on special themes were arranged to disseminate information and encourage discussion on topical environmental issues. In all, these meetings were attended by some 600 people, and two of them were on the subject of biodiversity.

Over a period of five months, from November 1995 to March 1996, the draft Local Agenda 21 for Norrtälje was circulated for consultation. During that period, a total of around 900 responses, ranging from angry criticism to praise and new ideas, were handed in. The draft document was revised in the light of these responses, and in November 1996 a finalized 'Local Agenda 21 for the Municipality of Norrtälje' was adopted by the Municipal Council.

Integration of biodiversity in the Agenda 21 process

A number of subject areas relevant to the municipality of Norrtälje were chosen at an early stage for inclusion in the Agenda 21 process, and it was natural that one of them should be biological diversity. This subject area was to encompass the plant and animal species of all natural habitat types occurring in the municipality. But biodiversity also formed an integral part of the subject areas forestry, agriculture, fresh waters and coastal waters.

The strategy for drawing up a Local Agenda 21 for Norrtälje differed from the procedure normally used to elaborate local government documents. The project organizers simply asked local people – through seminars, special theme meetings, lectures, brochures, information officers, environmental calendars etc. – what they wanted the Agenda to include. Some 550 responses were received, of which as many as 40 per cent related to waste (separation at source, composting etc.).

Interest in biodiversity was less pronounced, with just 3 per cent of the ideas submitted relating directly to this subject. These comments concerned both general issues, such as fauna and flora conservation, and more detailed matters, such as the re-creation of wood pastures. It should be added, though, that views on biodiversity were also submitted under some of the project's other 15 subject headings (e.g. fresh waters, coastal waters, agriculture and forestry). Of the 900 responses received during the subsequent consultation exercise, once again some 3 per cent concerned the subject of biodiversity.

Political parties, private individuals, forest companies, forest owners' associations, agricultural and environmental organizations were among those who expressed views on biological diversity. These bodies and individuals showed a great deal of interest in exerting an influence and making suggestions.

Biodiversity in the final document

The various chapters of the municipality's Agenda 21 contain overall objectives, background information and action targets. The overall objectives express in general terms what state of the environment is desirable or what measures need to be implemented. The background texts describe the present environmental situation in the municipality. Each chapter concludes with action targets, which describe what action is to be taken and by what date it is to be started or completed. An attempt was made to quantify these goals, to make it easier to monitor progress towards achieving them.

The chapter on biodiversity contains the following overall objectives:

- Plant and animal communities should be maintained so as to enable viable populations of plant and animal species occurring naturally in the municipality, and their genetic variability, to survive in natural surroundings.

- The habitat types characteristic of the Roslagen region should be conserved in the municipality.

- Plant and animal species which are entirely alien to the municipality should not be introduced into or allowed to increase in abundance in the natural environment.

- The introduction of genetically modified organisms should only be undertaken very restrictively and with adequate safeguards.

- Indigenous crop varieties and livestock breeds occurring in the municipality should be preserved.

The most difficult issue to resolve in the biodiversity chapter was how large a proportion of forest land ought to be protected. The consultation draft included the following action target: 'At least 5 per cent (approx. 100 ha) of productive forest land owned by the municipal authority should be given long-term protection from forestry by the year 2000.' In the final document, that goal was deleted in favour of the following, more generally worded one: 'Forest land should be given long-term protection from forestry to such an extent that biological diversity is conserved.' The reason for this was that forest companies and landowners' organizations were doubtful about fixing a percentage, given the existing state of knowledge.

Other action targets include:

- Forestry on land owned by the municipality (around 2,000 ha) should meet environmental certification standards by 1998.

- At least 15 wetlands, small bodies of water or game waters should be created, recreated or restored in agricultural areas by the year 2005.

- At least 10 open rich fens should be safeguarded by means of management, agreements or under the Nature Conservation Act by the year 2000.

- Buffer zones at least 6 m wide supporting vegetation, where chemical pesticides and fertilizers are not applied, should be established on river and stream banks and lake shores by the year 2005.

- The depth to which belts of brown algae extend in Norrtälje coastal waters should have increased by 2005.

- Biological diversity in day nurseries and schools – an important start.

Component projects relating to biodiversity

The following are a few examples of specific projects relating to biodiversity which have formed part of the Agenda 21 process or are closely connected with it.

Children and young people are a natural focus of efforts to promote biological diversity. In the municipality of Norrtälje, day nurseries and schools (34 in all) are encouraged to adopt a natural area in their vicinity. The land surrounding many of these institutions is owned by the local authority, but in certain cases private land is also involved. Sites adopted include overgrown pastures, lake- or sea-shore forest areas and lakes, and children visit them for environmental and nature study projects, to put up nest boxes, clear invading scrub vegetation, set up camp-sites etc.

Since 1989, the municipal authority has carried out annual biological surveys, the results of which are published in the 'Nature Conservation in Norrtälje' report series. Priority areas have been decided in the light of existing threats and gaps in knowledge, and have included both landscapes made up of farmland and lakes, and natural forests with large areas of mires. The reports describe the plant and animal life of the areas concerned and suggest how they could be developed and managed. They are intended to have a uniform and appealing design, making them accessible to ordinary readers with an interest in wildlife and the countryside.

The GIS-based natural environment database is used to store data from the 'Nature Conservation in Norrtälje' and other surveys, field visits, specialist literature etc. All notifications of timber felling in the municipality are subsequently checked against this information. The database is also used on an ongoing basis in conjunction with applications for dredging and building permits, detailed development plans, in-depth comprehensive plans, and siting studies of various kinds.

The Norrtälje Nature Conservation Fund is a non-profit-making body established by Norrtälje Municipal Council in 1989. Its aims are to disseminate information about the natural history of the Roslagen region, to make good use of public interest in conservation, to preserve sites and features of particular conservation value, and to manage nature reserves. Its board includes representatives of voluntary nature conservation organizations in the municipality. The Fund's financial resources derive from income earned on its capital and contributions from members of the public, organizations and authorities. Projects launched by the Fund include:

- A guidebook entitled 'Worth seeing in the Roslagen countryside', 5,000 copies of which have been published.

- Signposting and management of sites of conservation interest.

- ‘Save Uppland’s otters’: survey work, information aimed at landowners, restoration and protection of suitable habitats.

- ‘Save the three-toed woodpecker’ (*Picoides tridactylus*): survey work and action to conserve suitable habitats.

- Nature Conservation Conferences: annual conferences on specific themes.

Most of the projects are being run jointly with other interested parties.

The way ahead

Norrtälje’s Agenda 21 project is now largely completed. On 25 November 1996 the Municipal Council unanimously adopted a Local Agenda 21 for the Municipality of Norrtälje. However, the results of the Agenda 21 process and the component projects carried out in various parts of the municipality will be of enduring value and will be followed up in future environmental efforts at places of work, within organizations and within the local authority.

Efforts in support of biological diversity are now continuing on the basis of a recently adopted ‘Action Plan on Biodiversity for the Municipality of Norrtälje’, which was drawn up in the course of 1996 and 1997. This plan incorporates and further develops the biodiversity objectives of the Local Agenda 21. The difference between the two documents is that the action plan fully reflects the policies of the municipal authority, while the Agenda is the result of a broad-based process of cooperation and reflects the wishes of the entire community of Norrtälje with regard to biodiversity.

‘A Richer Forest’ – a successful information and education campaign

The following case study describes a major educational campaign organized by the Swedish Forestry Administration in the late 1980s and early 1990s. It has been prepared by the National Board of Forestry.

Forestry in Sweden – a background

Sweden is a forest country. Forestry and the forest products industry are of decisive importance to its economy and prosperity. For a long time, Western Europe has been this sector’s most important export market, but Swedish timber products, pulp and paper also find buyers in North America, Japan and India, for example. The net value of these exports is of the order of US$ 10 billion, putting Sweden in third place in the global league table, after the United States and Canada. ‘Modern’ forestry in Sweden began in the form of traditional harvesting of natural forests in the 19th century, and over the last 100 years the sector has gradually developed to its present position as a world leader. Half of Sweden’s forest land is owned by just over 300,000 private individuals, many of whom are farmers. The other half is held by a handful of large forest companies. The state now owns only around 5 per cent of the country’s forests, and the dominance of private ownership is thus very clear. As early as 1903, the Swedish Parliament passed what is generally described as the first real Forestry Act in the world. It emphasized the idea of wise husbandry and the need to take proper care of a scarce resource. At the same time, county forestry boards were established as supervisory bodies, but above all as providers of support, to which Swedish forest owners could turn to obtain advice on various questions, to buy seedlings, or to get help with practical matters such as forest management plans, road construction projects or marking of trees to be felled. Since then, advice and education have been the principal concerns of the Forestry Administration.

The first Forestry Act, passed in 1903, was followed by others in 1923, 1948, 1975, 1979 and 1994, each of them naturally reflecting the policies and priorities of its time. A dominant concern was the restoration of forests by means of silvicultural measures and balanced felling. In 1975 a new provision was added to the 1948 Forestry Act which was then in force, putting nature conservation questions on the forestry agenda for the first time. A few years later, through the 1979 Act, nature conservation received a great deal of attention in forestry legislation, and in the current Act, passed in 1994, nature conservation is put on a par with economic production in forest management. Sweden’s forests have been managed by people for a very long time, and only small fragments in remote areas can now be regarded as virgin forest. Silviculture and attention to nature conservation are now to be integrated in an approach which respects both economic and ecological values, in principle on every single hectare of forest land. There are 23 million ha of productive forest land in Sweden, final felling takes place on 40,000–60,000 sites every year, and it is above all in conjunction with final felling that the nature conservation measures which are to have an effect during the next rotation must be implemented.

Given the historical background and, in particular, the structure of ownership, the alternative of protecting very large areas of forest land and operating a more intensive form of plantation forestry in other areas is not appropriate as a general forests policy in Sweden. The most recent forestry policy decision, taken with the broad support of the different political parties, established the principle of multi-purpose management.

Forestry is a long-term enterprise. In Sweden, it takes 70–90 years to produce a tree, and foresters therefore often tend to be somewhat conservative and to adopt a wait-and-see approach in the face of rapid change. The idea that forest owners and managers should also take reasonable account of the interests of nature conservation was one relatively rapid change of this kind, which took time to gain general acceptance. In the 1970s, discussions between the forestry sector and nature conservationists, chiefly about clear felling and chemical herbicides to control competing vegetation, were very heated at times. To progress in the space of a few years from this marked disagreement to both an acceptance of and a readiness to implement nature conservation measures was, for many foresters, a big step.

The campaign 'A Richer Forest'

In the autumn of 1988, the National Board of Forestry developed the idea of a major educational campaign, aimed primarily at the small-scale forestry sector and constituting a synthesis of the training courses arranged in the 1980s for staff of the Forestry Administration, forest owners' associations etc. The campaign, which somewhat later was christened 'A Richer Forest' and given a blackcock (*Lyrurus tetrix*) as its symbol, was intended to impart new knowledge to forest owners and to modify their behaviour. As a result of the campaign, the forestry sector would it was hoped begin in earnest to integrate traditional timber production, adaptation of forestry to local site conditions, and nature conservation measures in its day-to-day operations. 'A Richer Forest' would in addition be used to increase public awareness and understanding of forestry. The memorandum outlining the campaign also made it clear that it needed to attract appreciably more participants than earlier educational efforts and to be open to interested nature conservationists and others outside the forest-owning community. Another important principle was that the education provided was to combine theory and practice, so as to generate the greatest possible momentum for change. The theory part was primarily to be covered by a richly illustrated, 130-page textbook entitled *Rikare Skog* ('A Richer Forest'), while the practical side would consist of field study trips. A number of videos were produced, designed either to help recruit participants or to supplement the textbook on specific topics.

At that time, the Forestry Administration consisted of the National Board of Forestry, 22 county forestry boards and some 250 forestry districts. The new educational programme was to be based on the districts, with a county coordinator at each county forestry board and two national project managers at the National Board who would primarily take their instructions directly from the Director-General. During 1989, various materials were produced, staff were trained and the field trips were planned, after which the campaign was launched in the autumn of 1990. Work could now begin.

Internal mobilization within the Forestry Administration

Finding suitable people to appoint as county coordinators was fairly easy, and over the years of the campaign these individuals fully justified the trust placed in them. Mobilizing the forestry districts, on the other hand, initially proved far more difficult. The forestry advisory officers employed at the district level have to manage a difficult balancing act between their role as officials, implementing government forestry policy, and the role of trusted advisers, to whom forest owners can turn with all manner of questions, on subjects ranging from harvesting techniques and damage by elk to choice of stands for felling, plant choice and training. Advisory officers often work in their respective districts for many years, and as a rule enjoy a large measure of trust among forest owners. A person in such a position, with strong local ties, cannot change his or her message or market new ideas as easily as an official with a more central post. This inherent conflict became apparent in the discussions held during the first autumn with district staff, whose committed involvement was crucial to the Richer Forest campaign. The solution proved to be the planned field trips: every forestry district was required to set up, before the campaign began, a field study trail incorporating locations which illustrated the whole of the Richer Forest concept, i.e. the integration of forest production and nature conservation, from the newly planted site, via the tending and thinning of the growing forest, through to the mature stand, ready for final felling. It was left to the districts themselves to decide where the trail points were to be located, what they were to look like and how many there were to be on each trail. Good quality was ensured by the fact that advisory officers were aware that they themselves would be guiding 'their' forest owners on their own trails. And that the field study trips would be repeated perhaps 20–30 times, with 10–20 forest owners on each occasion.

Some advisory officers found this a heavy burden to begin with, but gradually became more interested and committed. Many others felt that nature conservation issues had been conspicuous by their absence for far too long, and set about the task with enthusiasm. In any group of people, there is always someone who is regarded, explicitly or implicitly, as a leader. Once such a person has been won over to a cause, the problem is basically solved – all that remains is to give it sufficient time. This was found to be the case during the Richer Forest campaign.

Within the Forestry Administration, 258 field study trails on the theme of 'A Richer Forest' were set up in readiness for the start of the campaign in September 1990. By the end of the campaign three years later, over 70,000 people had taken part in field trips lasting 1–2 days, and the forestry advisory officers had thus played a decisive part in making 'A Richer Forest' the biggest and most important educational initiative ever. The initial hesitation had evaporated, many people were talking of a Green Revolution, and a few even wrote poems about their experiences during the campaign. In addition, the Administration was provided – into the bargain, as it were – with a field organization which was immediately able to take on the job of implementing the new forestry policy of 1993, with its equal emphasis on forest production and environmental compatibility.

Sectoral cooperation

Much of the success of the campaign and the considerable impact it had on day-to-day forestry can be ascribed to the excellent cooperation between different representatives

of the forestry sector which developed in conjunction with its implementation. 'A Richer Forest' proved to be the unusual phenomenon of the right message at the right time. Initially, the Forestry Administration focused on the 300,000 or so representatives of small-scale private forestry. At that time, corporate forest owners were not seen as a priority target group. This proved a mistaken assessment. Before many months had passed, the major forest companies were hard at work organizing internal staff training based on the Richer Forest material, developing everyday nature conservation measures in the field, drawing up company nature conservation policies, and elaborating landscape planning models and research programmes that continued to be developed long after the campaign had come to an end.

Forest owners' associations also became involved in the campaign from early on, and in most districts formal or informal joint bodies for 'A Richer Forest' were set up, comprising all or a majority of the players in the forestry sector and often, in addition, representatives of nature conservation organizations, adult education associations and hunters, as well as the occasional local government representative. These joint bodies were to play an important role in recruiting participants, establishing field study trails, marketing the campaign in the local press, and so on. The concerted approach taken also helped to focus on 'A Richer Forest' as something a forest owner or someone interested in forests could scarcely do without. Positive peer group pressure was generated among forest owners, which naturally made it easier to recruit people to study circles and courses.

Adult education associations and study circles

Sweden has a long-standing tradition of adult education, which goes back to the early years of this century and which is still very much alive – especially in rural areas. The core components of this tradition are the 'study circle' and the adult education association. The most important association from the viewpoint of forest owners and people living in rural areas is Vuxenskolan, the Adult Educational Association of the Federation of Swedish Farmers and the Centre and Liberal Parties. Another organization is the Study Promotion Association, which primarily arranges a variety of educational activities for people interested in outdoor recreation and representatives of the voluntary nature conservation sector. A third body in this context is the Workers' Educational Association, with roots in the labour movement, which organizes courses and study circles for forest workers and others. During the Richer Forest campaign, all the adult education organizations mentioned came to play a significant role, although the cooperation established between the Forestry Administration and Vuxenskolan was most important of all. A study circle usually consists of 8–10 people, who all have access to a specific course book or other materials – in this case the Richer Forest book – and who meet 8–10 times on a regular basis to discuss and study the subject chosen. During the three years of the Richer Forest campaign, 1990/91–1992/93, Vuxenskolan organized some 4,000 study circles and the other associations together a further 1,000 approximately. Each circle had an average of 10 participants and involved a total of around 30 hours of study.

The study circle method merits particular attention in that it is so suitable for a rural population, being a democratic and 'flat' approach to studying in which all the participants are both teachers and students. It can be used for basically any type of subject and, not least, it is inexpensive and cost-effective. There is no need for a paid

teacher, or for a classroom, since the group can meet in the home of one of the participants.

Other study methods

A significant proportion of Sweden's forest owners do not live in the immediate vicinity of their forest holdings, having their homes and usually pursuing another profession somewhere else, perhaps hundreds of kilometres away.

To offer these owners an alternative to the traditional study circle, which is often tied to a particular village, the county forestry boards arranged seminars or shorter courses in the evenings and at weekends. This was particularly common in the cities of Stockholm and Gothenburg. From a learning point of view, it is of course less effective to bring together 100 people in a lecture hall than to arrange study circles, but for many people this was the only option which was feasible in terms of time. A combination which proved very popular and effective was an evening seminar indoors and a daytime field visit to one of the trails. In Stockholm, a field study trail was even set up which began at one of the underground railway stations. Activities of this kind reached over 35,000 people.

'The Blackcock League'

In the initial stages of 'A Richer Forest', a target of a minimum of 60,000 participants was set. Given that no previous educational initiative by the Forestry Administration had attracted more than around 35,000 participants, this was an ambitious target, and indeed one which many even regarded as unrealistic. There are just over 300,000 private forest owners in all. If very old and very young owners are excluded, the 'real' target group numbers perhaps 180,000 people at most. The aim of reaching one in three of these people through the campaign was indeed ambitious. Under a scheme known as 'The Blackcock League', the national target of 60,000 participants was divided into 22 county targets, in proportion to the geographical distribution of forest owners. These targets were based on owners' places of residence, not on the counties in which their forest holdings were situated, and the Stockholm/Uppsala region was thus assigned the biggest share of the overall target. To begin with, this breakdown into county targets was only intended to clarify what proportion of the total each county was expected to achieve. Quite soon, though, a definite sense of competition developed between the counties. The volume of study activities was recorded at regular intervals, and on each occasion – 3–5 times a year – the results were published in a table giving details of study circles/adult education associations, seminars, field study trips, female participants and tutors. The Blackcock League thus served as both a stick and a carrot, although it was not entirely fair, since it took no account of the varying difficulty of implementing the campaign in different counties. By the time the campaign came to an end, after being extended for an extra year, 85,000 people had taken part, and the unofficial winner was in fact the Stockholm/Uppsala region, which had achieved 1.7 times its expected result. Clearly, a competitive element of some kind can enhance quite appreciably the results of a campaign of this kind.

Female forest owners

Among Sweden's more than 300,000 forest owners, a third are women who own forest land either jointly or in their own right. The majority have inherited their forest

holdings – which may have been in the family for several generations – while others have acquired them by purchase. Usually, a woman owns forest land together with her husband, and forests have tended to be regarded as male territory. During the first year of the Richer Forest campaign, a systematic effort to involve these female owners was initiated. It was somewhat tentative to begin with – this was a new target group which, despite its considerable size, had remained remarkably anonymous during earlier educational campaigns. Women were discovered to be a very rewarding group of forest owners to work with. In addition, they were extremely ambitious and interested in learning how to reconcile forestry and nature conservation.

The most effective approach was undoubtedly to arrange study circles and courses that were only open to women. The Forestry Administration's few female staff made a very committed effort to market Richer Forest activities among women, and also often acted as tutors themselves. The Richer Forest message was generally taken more seriously among women than among men. Since the campaign, it has been found, on the one hand, that women have very quickly applied what they have learnt to their own holdings and, on the other, that it has been easy to recruit them to new training courses on various subjects. In the end, almost 15,000 women forest owners took part in the campaign, which must be regarded as a very good result.

Contractors and machine operators

Swedish forestry is highly mechanized, and this is particularly true of harvesting operations. Over 90 per cent of all felling – thinning or final felling – is carried out by harvesters which not only fell, but also delimb and cross-cut the trees. The timber is then extracted by forwarders. Consequently, the operators of these machines hold a key position. A machine operator, whether employed by a major forest company or self-employed, can have an impact on a considerable area of forest in the space of one year. In recent years, there has been a clear tendency to make more use of independent contractors, and hence a growing number of small self-employed operators, making this target group more fragmented than it would have been had its members been employed by large companies in the traditional manner. For the purposes of the Richer Forest campaign, the people who physically harvest forest trees were of course a particularly interesting group, who needed to be almost individually identified. The predominance of small self-employed operators, with very long working hours and large debts to repay, meant that it was difficult to attract this group to traditional courses or study circles. The biggest buyers of felling services could relatively easily make participation in a Richer Forest course a condition for further contracts, but the many small, independent contractors had to be sought out in the forests themselves. Once a meeting had taken place at the machine operator's own place of work in the forest, it was quite easy to discuss in tangible terms how harvesting should be carried out, what groups of trees, edge zones, nesting trees, plant habitats etc. should be retained, and how the timber should best be extracted to minimize adverse environmental impacts. From early on, attention came to focus on the need for larger quantities of dead wood in forests, and operators were advised to use their machine capacity to create 3–4 m high artificial snags when carrying out felling. The dead wood provides a substrate for a large number of threatened species of insects and wood-inhabiting fungi, and is thus also important e.g. for woodpeckers. Severing a tree a few metres above the ground imitates the way in which nature and forest fires instantaneously kill trees and leave them standing with a full complement of nutrients.

The technique of leaving artificial snags soon became the machine operators' hallmark, and for many it was to be a gateway to a greatly enhanced understanding of nature conservation measures. The major forest companies have subsequently delegated a great deal of responsibility and discretion, concerning both nature conservation and the financial results of felling operations, to harvesting machine operators and their assistants.

As a result, harvesting crews are naturally finding their work more stimulating, but are also more likely to realize that they need to know more, which makes it easier to interest them in new courses.

International impact

Initially, 'A Richer Forest' was intended solely for Swedish forest owners and professionals. During the first year of the campaign, the Norwegian Forest Owners' Federation got in touch with the Swedish National Board of Forestry, resulting in the production of a Norwegian version of the book *Rikare Skog* and a national educational campaign in that country which, like its counterpart in Sweden, proved the most successful ever in the Norwegian forestry sector. Somewhat later, the Richer Forest idea was disseminated by the Helsinki Forest Board in Swedish-speaking areas of Finland. As the last of Sweden's Nordic neighbours, Denmark then produced a variant of its own, *Rigere Skov*, which was Danish in content, but derived its name, format and basic idea from Sweden. In advance of UNCED in 1992, it was suggested that the campaign book could be translated into English and presented as an example of sustainable forest management. *A Richer Forest* was very well received internationally, and has since been used as a source of ideas in a variety of contexts. It was for example presented at the ministerial conference in Helsinki in 1993, during the first meeting of the Conference of the Parties to the Convention on Biological Diversity in The Bahamas in 1994, and at the FAO's 50th anniversary celebrations in Québec in 1995. 10,000 copies of the English version have been printed, and it remains a relevant model for forest management in international contexts. A German translation was presented at the big Interforst fair in Munich in 1995 and has since been used to inform the large German-speaking market about forestry in Sweden. Most recently, a private initiative in Japan has resulted in a Japanese translation of the book.

What makes *A Richer Forest* interesting to the foreign reader is above all the way it integrates production and care of the environment. The similarity between the concept of 'A Richer Forest' and that of New Forestry in the United States is striking. Both are concerned with preserving, reinforcing or recreating, in managed forests, the characteristics, qualities and substrates of natural forests. In North America, the term 'retention system' is used, which corresponds precisely to the Swedish forest machine operator's or forest owner's practice of leaving trees, edge zones, groups of trees, artificial snags and wet forest sites when carrying out felling operations. Readers in Africa and Asia also find this nature conservation strategy both possible and economically viable. Another aspect which attracts interest is the focus on the Anderssons of Mon, a family with a small forest holding. The drawings of natural habitats and the photographs included are also very important in this context.

Incentive measures

An essential factor in an educational campaign like 'A Richer Forest' is that participation is entirely voluntary and that would-be participants seek out study circles, courses and field study trips because they are interested – influenced of course by marketing efforts of various kinds. Individual participants always paid for their own course materials and travel, and had to make the necessary investment of time. Through the Forestry Administration and the adult education associations, the state basically provided this educational programme free of charge. A small charge over and above the cost of materials could sometimes be made, but for the most part participation was free. According to a rough estimate, total financial support for the Richer Forest campaign from central government came to SEK 800–1,000 per participant. That includes working hours and expenditure directly invested in the campaign, but also certain overheads, marketing, printing costs etc. Personnel costs are naturally far and away the dominant component. The final number of participants in campaign activities is usually said to have been 100,000, corresponding to a total cost to the public purse of SEK 80–100 million. In return, the state obtained from the forestry sector quite a dramatic change in forestry practice and in particular in harvesting methods, and the felling areas of today have little in common with the much-discussed clear-cuts of the 1970s. During the campaign, it was stressed that around 5 per cent of the felling volume needed to be retained for the benefit of fauna and flora, and for many this was at the time a dramatic message. Today, the forestry sector seems fairly united behind even higher levels of retention, for example in the context of certification. With an actual harvesting volume of 70 million cubic metres, retention of, say, 8 per cent for nature conservation corresponds to over 5 million cubic metres a year. The cost of this provision for conservation is borne by the forest owner – state support for forest nature conservation is not available in this context. Financial support is given for nature reserves and other forms of site safeguard, not for conservation practices forming part of day-to-day operations. In the long term, attention to the natural environment in line with 'A Richer Forest' and follow-up activities will in principle affect every hectare of managed forest land in Sweden.

Conclusions

- Particular note should be taken of the advantages of an integrated approach to forest management which offers a reasonable compromise between the economic, ecological and social values generated by forests. Ownership structures naturally play a decisive role in this connection, but the example provided by 'A Richer Forest' shows that it is entirely possible, working on a small scale, to encourage private forest owners to make significant efforts to conserve biodiversity. In this context, small-scale but frequently repeated measures can in the long term make a decisive difference. The principle of seeking to imitate natural disturbances is very important from an educational point of view.

- Education and information are admittedly 'soft' policy instruments, but can nevertheless generate considerable momentum for change. The sectoral principle, involving a responsibility and a sense of participation for all concerned, is of major importance. The broadest possible cooperation between different actors should therefore be sought, so as to underline the shared responsibility for maintaining biodiversity.

• Practical demonstrations in the field are usually far superior to theoretical discussions when it comes to preserving biodiversity. The complexity of fauna and flora makes it almost impossible to focus on species. Demonstrations should therefore concentrate on the substrate and habitat level, e.g. on dead wood, old aspens (*Populus tremula*), unusual trees, all wet sites or all transition zones. In addition, a number of conspicuous symbolic species such as the white-backed woodpecker (*Dendrocopos leucotos*), otter (*Lutra lutra*), golden eagle (*Aquila chrysaetos*), freshwater pearl mussel (*Margaritifera margaritifera*) etc. are needed to illustrate the action required and the levels at which it must be taken.

• An educational campaign with a message which calls for far-reaching change only has a chance of succeeding when all those in positions of leadership and management give their open and clear backing to the intended change. The groundwork needed to secure such an attitude is very important and can hardly be painstaking enough. Similarly, the individual or individuals entrusted with spearheading the change must be given a clear mandate for their task.

• The experience gained from the Richer Forest campaign in relation to Sweden's female forest owners shows that it is easy to involve women in the conservation of biodiversity and that they perhaps find it easier to translate theory into practice than men do. The technique of study circles with women participants only is a very effective instrument in this connection, and a combination which should be used in education and training in many other areas – agriculture, land use, energy, water etc.

• The international community has shown a great deal of interest in 'A Richer Forest' and in integrated use/conservation of forests. The world could do with a number of other similar forest management models, drawn from other parts of the world and other forest ecosystems. Important components include a clear message, identification of relevant actors, practical demonstration trails and, in particular, amply illustrated information material.

• Sweden's Forestry Administration will continue to mount educational campaigns at 3- to 4-year intervals in order to focus on important topics. Next in line is 'A Greener Forest', which will place more emphasis than 'A Richer Forest' on production aspects and the renewability of forest resources, while assessing nature conservation needs and priorities from a broader landscape perspective.

Long-term cooperation to conserve domesticated biodiversity: The SADC Plant Genetic Resources Centre and the Nordic Gene Bank

The Swedish International Development Cooperation Agency (Sida), together with its counterparts in the other Nordic countries, has since 1989 been supporting the development of a regional gene bank in the countries of the Southern African Development Community (SADC). The project is being implemented with advice and technical assistance from the Nordic Gene Bank (NGB).

The aim of the project is to build up, over a period of 20 years, an infrastructure that will make it possible to conserve above all the indigenous plant genetic resources of the SADC area for use in future plant breeding programmes. The idea was to establish a regional centre, the SADC Regional Gene Bank (SRGB, now the SADC Plant Genetic Resources Centre, SPGRC), for long-term storage, and national centres for medium- and short-term storage and distribution. The project was seen as a very necessary component of the SADC's programme to increase per capita output in agriculture, since it was predicted that, without such a project, that programme would result in the rapid disappearance of plant genetic resources, particularly indigenous and local resources. By ensuring the early collection, conservation and documentation of plant genetic resources, the project was thus intended to safeguard access to such resources within the SADC, while also providing a forum for a scientific exchange of ideas and knowledge.

Prior history

The preparatory stages of the project spanned the period 1985 to 1988, i.e. before the Convention on Biological Diversity (CBD) entered into force in 1993. The African member states of the Southern African Development Cooperation Conference (SADCC) at that time were Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe. Since then, the SADCC has become the SADC, and a further three countries have joined: Namibia, South Africa and Mauritius.

In September 1986 a consultation was organized in Lusaka, Zambia, by the International Board for Plant Genetic Resources (IBPGR, now the International Institute for Plant Genetic Resources, IPGRI), an institute under the Consultative Group on International Agricultural Research (CGIAR). As a result of this consultation, a project extending over 20 years, divided into five four-year periods, was recommended, with the Southern African Centre for Cooperation in Agricultural Research (SACCAR) as the implementing agency, the Nordic Gene Bank (NGB) as the executing agency, and the Nordic countries as donors, with the IBPGR and the various International Agricultural Research Centres (IARCs) acting as advisers. National financial support was to be based on cost-sharing between the African SADCC countries.

It was also proposed that the SRGB should be an independent institution directed by a board that would include a representative of each country, the chair of the relevant

national plant genetic resources committee, and chaired by a representative of SACCAR. The national centres were seen as counterparts to the SRGB and were intended to be responsible for collecting, *in situ* conservation and utilization of plant genetic resources.

Working groups were expected to be set up at both the SADCC and the national level to be responsible for scientific knowledge relating to the different crops, their members consisting of specialists in the crops concerned.

Training and education were intended to form a vital part of the project. It was proposed that theoretical education should be provided at the University of Birmingham, which had an MSc course, and that practical training should initially be given at the NGB. The IBPGR and the various IARCs were expected to play a very active part in this context. It was envisaged that the entire training and education component would be financed out of project funds.

The recommendations made at the consultation in Zambia in 1986 were followed in all essential respects, resulting in a project supported by the five Nordic countries. The project, which was envisaged as an almost entirely *regional* undertaking, was intended to operate within the scope of what is now Article 9 and, to a lesser extent, what is now Article 8 of the CBD. Its mandate was limited to agricultural and horticultural plants, i.e. to what the Food and Agriculture Organization of the United Nations (FAO) today calls plants 'for food and agriculture'. Since the entry into force of the CBD and under its influence, the project has gradually been broadened and is now beginning to cover more of the elements referred to in Article 8, i.e. *in situ* conservation and cooperation with various non-governmental organizations (NGOs), initially at the regional level. The beneficiary countries are also very interested in widening the mandate to include medicinal and ornamental plants and forest trees.

Partners

SACCAR

SACCAR, based in Botswana, is the Nordic countries' opposite number in Africa with regard to the project. It is the SADC's body for the coordination of action relating to agriculture in the region. Apart from providing a chairperson for the project during its first two four-year periods, SACCAR has evaluated the project annually together with Sida and the NGB, and approved the plan of work and budget for subsequent years.

SPGRC

The SPGRC is at once a result of the project and one of the parties involved. As a regional organization, it is modelled, with certain modifications, on the NGB. As was noted earlier, the Centre is governed by a board which includes national representatives. A director is responsible for day-to-day management. It should be mentioned that, with the exception of the first two years, all SPGRC staff have been SADC nationals. The exception during the initial years consisted of a Swedish project manager, who was appointed to get the project started and to help recruit a director and the first members of staff.

Sida and the other Nordic donors

All five Nordic countries, Denmark, Finland, Iceland, Norway and Sweden, declared themselves willing to participate in the funding of the project through their development cooperation agencies: DANIDA in Denmark, FINNIDA in Finland, ICEIDA in Iceland, NORAD in Norway and Sida in Sweden. Sweden was chosen to coordinate the project, which among other things meant that Sida became responsible for the annual review, for disbursements and for cooperation with the NGB.

NGB

The Nordic Gene Bank is a Nordic institution, i.e. it serves as a joint gene bank for the conservation of plant genetic resources for all five Nordic countries. It was officially opened in January 1979. It is governed by a board made up of two representatives of each Nordic country, one from a central government agency and the other from the plant breeding sector, state or private. Day-to-day management is in the hands of a director.

In practical terms, the NGB corresponds to both the SPGRC and the national centres in Africa, that is to say, long-term storage, a base collection, short-term storage, the active collection and storage of duplicate samples are all gathered under a single institutional roof. When the project was launched, the NGB was the only truly regional gene bank; now it has been joined by the SADC Centre. The NGB's role in the project has been to ensure that it has been established and operated to internationally acceptable standards, and to provide technical and scientific education and training.

The NGB's mandate encompasses all plants used in agriculture and horticulture, with the exception of ornamental plants, and, following a recommendation by a working group, culinary herbs and spices and medicinal plants. Forest trees have long been the responsibility of separate institutions in the Nordic countries. Details of the species being collected, and the intensity with which they are being collected etc., can be found in the list of 'mandate species'.

Much of the practical side of transport to and building work in Africa has been undertaken by the NGB through what is now Svalöf Weibull AB, which has played a very important part, particularly in the early stages of the project.

The project

The chief purpose of the project was to support the development of a regional network for plant genetic resources. In practice, this involved support for the establishment of a regional institution (including buildings and regional staff), combined with education and practical training of both regional and national resource persons. It was intended that the national part of the project, the National Plant Genetic Resources Centres (NPGRCs), would operate with national funding from the countries concerned. However, Sida has provided some support for NPGRCs outside the project budget, via the SPGRC board.

The actual infrastructure of the Centre was built in 1989–92, and the new building was ready for use in November 1992. The first staff, however, were taken on as early as 1990. On the national side, it may be mentioned that Tanzania and Zambia held the

first national working meeting. It was announced as early as 1991 that the SRGB, then still in provisional accommodation, was ready to receive plant genetic resources material. In 1992, therefore, the first collecting missions supported by the project were undertaken, in Zambia and Namibia. The first regional working groups (for different crops) held meetings in 1993.

Funding from the Nordic donor countries, provided in accordance with the normal scale of assessments for Nordic cooperation, has been pooled and subsequently allocated in the recipient countries by Sida. The annual budget drawn up by the SPGRC has been scrutinized at annual meetings between the donor countries and representatives of the NGB and, a few years into the project, the SPGRC itself. For the first few years, until 1994, all disbursements for the African part of the project were made via the NGB, whereas in recent years they have gone to the SPGRC direct, which has then allocated them in line with the agreed budget.

According to the original agreement, the Nordic donor countries were to meet the entire cost of this regional project up to and including the 10th year, after which the SADC would defray 10 per cent of the cost in year 11, 20 per cent in year 12, and so on. However, the SADC has already covered some of the cost of the project.

The first external review took place in 1991. In 1992, the project was scrutinized once again, and the review group concluded that the project was extremely important and recommended continuing support. A sustainability study of the project, financed by DANIDA, was undertaken in 1993, with the purpose of ascertaining the SADC countries' capacity to continue to operate the network when the project came to an end. It concluded that the annual cost of running the SPGRC was between US$ 659,000 and US$ 1,067,000, at 1993 prices.

Factors shaping the operation of the project

At the international level, various international agreements, such as the CBD, define the overall framework of the project (see also below under 'Conflicts and problems').

Of various other factors, availability of resources, i.e. funding, has been extremely decisive to what has been achieved. The NPGRCs have been under-resourced throughout and unable to carry out the necessary inventory and collecting work, and they have therefore been dependent on financial assistance from the SPGRC.

For the actual operation of the project, the annual reviews have been of great importance. The review missions of different kinds initiated by the donor organizations over the years have probably meant less to the African recipients than to the Nordic donors.

Conflicts and problems

The principal conflict has been over the basic idea of the project, namely a regional as opposed to a national approach. The principle of a regional approach has been criticized at several levels.

Some have claimed, with a certain amount of justification, that it would be appreciably easier for both donors and recipients to administer and manage a bilateral project. On the other side of the balance there is the regional African interest, arising from the fact that the various countries of the SADC, like the Nordic countries, have the majority of ecological zones in common. With a national approach, it would be very difficult to coordinate the collection, conservation and also the use of plant genetic resources between the SADC countries. Such difficulties obviously also exist with the regional approach, but the latter does have the advantage of providing a common forum for discussion. In addition, it may be noted that a structure based on the individual countries would require a multiplication of long-term and duplicate storage, greatly increasing the cost. At the same time, the experience gained at both the NGB and the SPGRC shows that a regional structure is dependent on properly functioning national activities, i.e. national collecting must be undertaken and satisfactory cataloguing and storage must be ensured.

One conflict which has arisen since the CBD came into force relates to Article 3, concerning the question of ownership of genetic resources (biological diversity). From the outset, the project was based on FAO's relatively widely accepted tenet that plant genetic resources are the common heritage of the human race. The CBD replaced this principle with that of national sovereignty. The present conflict revolves in particular around rights over resources of substantial economic and use value, such as medicinal plants and plant genetic resources (and knowledge about these). The CBD also stipulates that transfers of genetic material between countries are to be governed by agreements ('mutually agreed terms'). This makes regional solutions more complicated, both legally and practically.

In addition, the CBD emphasizes the importance of *in situ* conservation, regarding *ex situ* measures as an important complement. A risk that exists if donor organizations focus too narrowly on a regional gene bank is that there could be less scope for national strategies to combine both *in situ* and *ex situ* conservation.

Conclusions

- As a result of the project, there are already a significant number of individuals with an understanding of plant genetic resources and their collection and conservation in the SADC region of southern Africa. This fund of knowledge may be expected to grow as the project progresses. Collaboration with the NGB has also been constructive in many ways and has contributed to the capacity-building and development of knowledge and skills that have taken place.

- Benefits arising from coordinated handling of plant material (long-term storage, coordinated collecting, coordinated education and training etc.) have also undeniably been achieved as a result of the regional approach.

- At the same time, the experience gained (at both the SPGRC and the NGB) shows that properly functioning national activities and gene banks are essential if regional cooperation is to work in the long term. It also remains to be seen how the African countries collaborating on the project will divide their resources between national and regional activities in the future, when external funding comes to an end.

• In addition, it is essential to analyse the consequences of the CBD (and national rights over genetic resources) for future regional cooperation. The donor organizations, the NGB and the national and regional partners must all take this question into account, to ensure that it is regulated in mutual agreements of various kinds and in national legislation.

Organic coffee growing in the shade of the Mata Atlantica in Brazil

Since 1996, the Swedish Society for the Conservation of Nature, in collaboration with the Swedish coffee wholesaler Arvid Nordquist, has supported a project in the Mata Atlantica mountain rainforest area of Brazil. The aim of the project is to conserve the ecosystems of the area and to protect biological diversity by supporting the development of ecologically and economically sustainable agriculture, with the emphasis on coffee production.

Background

Increasingly, agricultural commodities from the developing world for which commercial demand exists in the North are being produced by methods based on plantation monocultures, involving high inputs of chemical fertilizers and pesticides. This is increasing the risk of ecological and environmental problems in and around the areas where production takes place.

Moreover, since the choice of seeds and crops is often limited to those available commercially, the biodiversity of the agricultural landscape is declining, both in terms of variation within and between agricultural crops and as regards the habitat diversity of the landscape.

The project area

The Mata Atlantica is an Atlantic rainforest with very high species diversity in the state of Ceará in Brazil. The Baturité mountain area forms one part of it. In pre-colonial times, the Mata Atlantica stretched from Maranhão in the north to Rio de Janeiro in the south. Today, its remnants in the state of Ceará consist basically of a 330 sq km reserve (established in 1990). Despite intensive agriculture in the Baturité area, this area has managed to retain much of its species richness.

The coffee grown here, introduced by the Portuguese in 1824, is an Arabica variety of unknown origin. Most of the plants are of considerable age, up to 100 years old. Coffee has been produced at relatively high altitudes in the shade of the trees of the Mata Atlantica, without man-made inputs, and it has acquired a characteristic flavour. In the 19th century, coffee bags were stamped ‘From Baturité’ as a mark of quality.

The coffee of the area is a ‘shade coffee’, i.e. it is grown in the shade or semi-shade alongside other plants, in particular the trees and shrubs of the original forest. This is a traditional agroforestry system using tall trees (*Ignacera*), both from the original dry rainforest and planted. Organic material recycled from the forest acts as a natural fertilizer and retains moisture. The forest plays a part in water management throughout Ceará, as well as providing shade for the coffee bushes, and farmers therefore value it highly. There is a unique bird fauna here, for example, including at least six endemic species, and birds are one of the natural means of insect control in the area. Nitrogen fixation and green manuring are used to improve the soil, and many farmers also culture earthworms as soil conditioners.

Coffee, like money in the bank, offers financial security, and is perhaps more dependable in that respect. However, with increasing global intensification of agriculture, this crop has become less profitable. More and more farmers are giving up coffee growing, some of them finding vegetable production, for example, a more attractive proposition. A few decades ago, a state initiative was taken to introduce 'sun coffee', in an attempt to increase yields. This type of coffee was unable to cope with the dry climate, though, and farmers returned to the traditional varieties. At the beginning of the 1970s, the state launched a project to replace coffee production with agrochemical-intensive production of vegetables.

Origins of the project

For several years now, the Swedish Society for the Conservation of Nature has organized a campaign week to promote environment-friendly consumption (under the heading 'Be an eco-friendly shopper'). After the 1995 campaign, which among other things promoted organically grown coffee, the Society was contacted by the Swedish organization Future Earth and a representative of the Swedish friends of the Fundação Cultural, Educacional Popular em Defesa do Meio Ambiente (CEPEMA). CEPEMA had managed to interest the Ceará state government in coffee production in the region – not least with the regional policy aim of maintaining employment in the agricultural sector. It was now looking for co-funding for a project entitled 'Organic coffee growing in the Mata Atlantica of north-eastern Brazil'.

Interested parties and partners

Fundação CEPEMA

CEPEMA, the Centre for Popular Education in Defence of the Environment, is a Brazilian non-governmental organization which since 1989, with Swedish support, has been working in the northern part of the state of Ceará in north-eastern Brazil. CEPEMA provides environmental education for small-scale farmers in rural areas, with the aim of encouraging the adoption of organic farming methods. Among other things, it has a training centre for small-scale farmers, arranges field days on agro-ecology, and holds seminars for women and young people in rural areas. In order to reach illiterate people, too, CEPEMA uses radio broadcasts as an educational tool.

Producers

Many of the coffee producers belong to the older generation and have a sound understanding of the natural environment and its significance for coffee production. Recruiting young people has proved difficult because of the poor prospects offered by coffee growing, attributable among other things to falling coffee prices. Yet a viable agricultural sector offers social and financial security, reducing the need for people to leave rural areas. With their long experience of organic farming, farmers here can secure a market advantage from the growing demand for organically produced raw materials.

The state government

CEPEMA has worked with the Ceará state government for a long time. From a regional policy point of view, an expansion of coffee production could lead to a stabilization of agriculture, in both economic and social terms.

Future Earth

Future Earth has been collaborating with CEPEMA since 1989. This Swedish organization has primarily focused on direct cooperation with organizations in the developing world, rather than, as the Society for the Conservation of Nature has done (see below), pursuing an active dialogue with companies and consumers in Sweden, which is an important aspect of this project.

Swedish Society for the Conservation of Nature

In parallel with its efforts to promote biodiversity in the agricultural landscape, the Society has also sought to influence consumers, in particular through collaboration with the KRAV Certification Body and its own ecolabelling scheme 'Good Environmental Choice'. In recent years, its links with environmental organizations in the South have been developed and strengthened and attention has come to focus on products produced in the South and consumed in the North. Since 1990, the Society has organized an annual 'Environment Week', and in 1995 and 1996 the themes were 'The world in your coffee cup' and 'Cheap bananas have their price', using coffee, bananas and king prawns to illustrate prevailing consumption patterns.

Arvid Nordquist

Arvid Nordquist is a family business which imports and sells coffee wholesale, with a product range recognized as meeting high quality standards. The company was chosen as a partner for the project because it was interested in launching an organic alternative and at the same time establishing close cooperation with producers, not least in the area of product development.

KRAV

The KRAV Certification Body is a Swedish NGO originally involved solely in the certification and marketing of Swedish organic produce. KRAV has subsequently begun to support the establishment of local certification bodies in developing countries for products which eventually reach the Swedish market. Its cooperation with CEPEMA is one example of this.

Description of the project

A three-year pilot project was launched with the aim of strengthening the position of farmers in the area, while also protecting the natural environment. If successful, the project could be extended to a larger number of growers. In Sweden, the aim is to create a greater understanding of the environmental problems associated with the growing of coffee, particularly for the export market, and to highlight the advantages of organic production. The project involves close collaboration between the Swedish Society for the Conservation of Nature and CEPEMA.

The main purposes of the project are

- to support the development of ecologically and economically sustainable agriculture, with the emphasis on coffee production, and
- to play a part in conserving the ecosystems of the area and preserving its status as a reserve, while improving the chances of coffee-growing farmers (women and men) making an adequate living.

The project includes:

- Activities to encourage the conservation of biodiversity in the Baturité area and to promote soil and water conservation.
- The establishment of a gene bank for the type of coffee produced in the area, creating a basis for quality improvement by means of plant breeding.
- Activities to disseminate knowledge about natural fertilizers, nature conservation etc., and to ensure that this knowledge is incorporated in the cultural patterns of farmers.

This project also benefits women, since they have traditionally played an important part in coffee production in the area. Coffee beans are primarily picked by women, as agricultural workers, alongside small-scale farmers. Women have also received training in grading techniques to enable them to specialize in this type of work.

Practical implementation of the project

After the 1995 Environment Week organized by the Swedish Society for the Conservation of Nature, during which coffee was the main theme, the Society felt a need to develop the debate about the value of organic production by linking this issue to biodiversity. The suggestion put forward by CEPEMA and Future Earth was ideal in terms of building on the Society's earlier activities. A joint project with CEPEMA and involvement in the launch of another organically grown coffee on the Swedish market enabled the Society to draw greater attention to these aspects of the question and to promote a public debate.

At an early stage, CEPEMA set up a working group to create awareness of the region and to design a programme to recruit and provide advice to coffee growers interested in participating in the project. The basic framework for a project was already in place when the Society was contacted. More and more coffee producers were identified as the preparatory phase progressed.

The Society for the Conservation of Nature decided to support CEPEMA financially, too, initially for a period of three years. The funds provided are being used for training and on-the-spot advice to farmers, to pay the salaries of an agricultural scientist and two agricultural technicians, and for documentation and certain aspects of administration.

The Ceará state government's assessment was that support for organic agriculture in the region, in collaboration with CEPEMA, would bring financial, ecological and social benefits. It finally promised to provide half the funding for the project, including support for the establishment of permanent facilities for domestic marketing.

The KRAV Certification Body visited the region early on, in conjunction with a seminar on organic farming. At the same time, field visits were made to coffee farms. This also provided a basis for assessing how long it would be before coffee from the region could be certified by KRAV.

In Sweden, CEPEMA, Future Earth and the Society for the Conservation of Nature then began to look for a suitable importer who would also be willing to make a

commitment to the project. After contacting a number of companies, their choice fell on the family firm Arvid Nordquist, which had not yet marketed an organic alternative. It was decided that the aim should be to launch the Brazilian coffee on the Swedish market during the 1996 Environment Week.

A representative of Arvid Nordquist travelled to Brazil to visit CEPEMA and the growers on the spot. The importer's wishes concerning quality and quantity were discussed and various advice was given on grading and other aspects of processing. Contact was established with a port through which the coffee would be exported. CEPEMA and Arvid Nordquist entered into a 'gentleman's agreement' regulating the quantity and quality of forthcoming orders.

The project manager at the Society for the Conservation of Nature visited CEPEMA and the producers to establish proper contact and discuss the design of the project. A meeting was also held with the environmental authority responsible for management of the nature reserve. The Society's representative paid a visit to the Secretary to the Governor of Ceará and presented and discussed the 'coffee campaign' organized in Sweden, as well as organic production in general. This opened the state government's eyes to the existence of a growing market for organically grown products in consumer countries.

CEPEMA's approach has been to provide advice to farmers and discuss the project with them, in parallel with field days. Activities in the field have gradually been built up with the help of agricultural scientists and technicians from the organization.

The growers set up a producers' association, the Associação dos Produtores Ecologistas do Maciço de Baturité, consisting of organic growers from Maciço de Baturité. It has its headquarters in Mulungu, but its members operate in Guaramiranga, Aratuba and Pacotí, as well as Mulungu itself. The association also regularly disseminates information about the project to other growers.

The producers' association has been responsible for commercializing the coffee. When it was agreed that the coffee was to be exported to Sweden, 60 women were hired and given training in grading techniques. This group consisted of young women, students and married women, who are traditionally involved in harvesting coffee.

In Sweden, various preparations were made for the importation and launch of Mata Atlantica coffee. In autumn 1996, *Sveriges Natur*, the magazine of the Society for the Conservation of Nature, carried a report on the producers and the coffee-growing project. With the help of a representative from CEPEMA, courses were arranged for active members of the Society. The latter in turn spread the word at the local level, not least during the 1996 Environment Week. Future Earth, together with the Society, helped to ensure that Arvid Nordquist's sales representatives were informed about the overall scope and idea of the project and about organic production. The company's environmental affairs staff were also informed.

In collaboration with the Study Promotion Association, the Society for the Conservation of Nature and Future Earth made a video about the producers and the organic coffee production in which they were involved.

Arvid Nordquist alone has been responsible for launching and marketing the coffee in Sweden. The Society and Future Earth have received sponsorship money for the use of their names on the packaging, and both organizations have also been involved in various launch events.

In the course of 1997, the first group of 70 producers certified by KRAV have received a repeat visit from an inspector from that organization.

Results

The project and the interest it has aroused, particularly among those involved and among Swedish consumers, has had beneficial consequences that were not originally expected. The state government has put CEPEMA in charge of training in organic farming for young people. Funds for this have been provided *inter alia* by the state's employment, social security and environmental authorities. Further support for training has been promised for next year.

The municipalities in the state are to be involved in the coffee project by means of information about it targeted on municipal agriculture officials. This is part of an endeavour to ensure that coffee production is integrated into municipal planning and to demonstrate to municipalities the long-term economic viability of coffee production.

To date, KRAV has made two field visits for the purpose of certifying growers. It intends to train local inspectors who will eventually take over the Swedish organization's role on the spot. This is in line with plans for the project.

Incentives and conflicts of interest

If the Mata Atlantica is to be safeguarded, growers must be assured of a reasonable income from organic farming, and this form of agriculture must gradually be improved and developed. It is both desirable and necessary to create conditions which will allow people to continue to make a living in rural areas, and to avoid an accelerating process of urbanization.

Buyers, for both domestic and overseas markets, play an important part in creating both demand for organic produce and channels for its distribution. In that they also provide the basis for a system of finance and help to ensure continuity of demand, they can greatly improve conditions for small- and larger-scale organic producers.

The prices paid to growers have to be competitive, in order to prepare the ground for establishment on the market and at the same time to make possible the necessary investments of capital and labour. In addition, the prices set by the importer/wholesaler are important in ensuring good sales of the product on the Swedish market. Price is a more important factor than brand name in determining consumers' choices between competing organic coffee products.

Conflict of interests between the importer and CEPEMA

CEPEMA has come up with an excellent way of combining a product for the Swedish market with measures to build up and strengthen the local market. It is in the

importer's interest to obtain a product which is of a high quality and which is organically produced.

In economic terms, it is difficult to raise the money to pay for all the work that has to be done before the coffee beans are finally ready to be exported. It is only at that stage that cash is forthcoming from Arvid Nordquist. Despite calls from both CEPEMA and the growers, no advances have been paid.

Plans for further development of the project include the establishment of a local roasting plant to allow producers to gain greater control of processing and also to pave the way for an expansion on the local market.

Conflict of interests between the importer and the producers

The dialogue between company and producers has been somewhat complicated, since Arvid Nordquist has definite views on flavour and quality, at the same time as the growers have produced coffee with a flavour and quality that are excellent for local conditions.

Conflict of interests between the importer and the Society for the Conservation of Nature

Companies like to maintain a high profile in connection with organic products. At the same time, it is important that they are wholeheartedly committed to organic production and aware of its importance to both producers and consumers; that their approach is one of allowing their operations to be guided by environmental considerations, rather than having a few organic products as the sum total of their effort in this area. As far as coffee is concerned, Arvid Nordquist should seek to ensure that its raw materials generally are organic, rather than just one variety within its overall product range.

Who has paid for the project?

Certification by KRAV, which is necessary for sales of organic produce on the Swedish market, is a very costly process. It would have been totally unrealistic to expect the growers or CEPEMA to bear that cost. However, it will be possible for them to do so in the future, when output and sales have increased somewhat. What is more, future running costs will be lower than the initial cost, since the plan is for responsibility for inspection to be transferred to local certifiers trained by KRAV.

Arvid Nordquist has provided sponsorship money, in the form of lump sums to the Society for the Conservation of Nature and Future Earth, in return for the company's use of these organizations' names on the packs of coffee it sells.

Conclusions

Biodiversity and commercial production

The Swedish Society for the Conservation of Nature became involved in the project – as a driving force and catalyst – because it offered an opportunity to make clear the links between biological diversity, organic production and regional effects in the producer country. The project shows that it is possible to combine efforts to conserve

biodiversity with commercial production. It is important, though, to create awareness of the differences between organic farming using methods which conserve a high degree of biodiversity, as in this project, and monoculture-based organic production, which is associated with a far lower level of biodiversity.

Interaction between companies, producers and organizations

It is clear from the interaction between a company, producers and organizations that has taken place here that these different parties have differing perceptions of the aims of the project. A company is often interested in finding a commercially viable product, and tends to see 'organically produced' as a sales argument and a source of goodwill for the company, rather than a step towards a radical change in its overall outlook. The concerns of the producers are to establish organic agricultural production with the least possible impact on precious resources, to promote regional development and to create social security, for both existing and future growers. Fundação CEPEMA wants to promote the development of organic production methods, regional development and social justice. Taking the producers' wishes into account, it is elaborating strategies to achieve these objectives. Future Earth and the Society for the Conservation of Nature are seeking to support the efforts of environmental organizations in the South to promote sustainable development. In addition, the Society has established a dialogue with retailers and with aid donors. This dialogue is also important in bringing about changes in consumption patterns and lifestyles, for example.

Appendix 1.
Development cooperation activities relating to biodiversity

The following is a list of the most important projects and programmes relating to biodiversity funded by the Swedish International Development Cooperation Agency (Sida).

1) Agrobiodiversity

- Support for the Consultative Group on International Agricultural Research, a significant proportion of which goes to projects relating to biodiversity, including plant genetic resources.
- The Community Biodiversity Development and Conservation Programme, a network to support local plant breeding and enhance cooperation between 'modern' international and traditional local plant breeding activities.
- In the SADC region, support for the SADC Plant Genetic Resources Centre and national gene banks.
- Support for improved seed production, within the country programmes for Mozambique and Zambia.
- Survey of sorghum varieties in Zimbabwe.
- Funding for research on weeds in small-scale agricultural systems in Luapula, Zambia.

2) Forestry

- The FAO-based Forests, Trees and People Programme, in which methods for local and sustainable use of tree and forest resources are being developed.
- Support for forest programmes in Laos.
- Development of rapid propagation methods for indigenous tree species of economic significance in Ethiopia.
- Research into the ecology and management of indigenous forests in Zimbabwe.
- Development of improved management systems for dry tropical forests.

3) Marine environment/coastal zone development

- Regional marine research in East Africa, South-East Asia and the Caribbean.
- Cooperation with the International Centre for Living Aquatic Resources (ICLARM) relating to development in marine and coastal areas (fisheries and the coastal environment).
- Support through ICLARM for ReefBase's international work on coral reefs.
- Support through the International Coral Reef Initiative for international activities and knowledge advancement relating to coral reefs and their importance.
- The World Resources Institute's international and knowledge advancement activities relating to coral reefs and their importance.
- Cooperation with the East African Regional Seas Programme of the United Nations Environment Programme: preparatory activities (updating of the Nairobi Convention, inventory of current activities in East Africa, and programme planning to establish a Regional Coordination Unit), together with pilot activities and project support.

- Support through the International Atomic Energy Agency for studies of the distribution and effects of pesticides in marine and coastal areas.
- Marine environment projects through the Asian Development Bank (Coastal and Marine Environmental Management in the South China Sea, phase II: Cambodia, Vietnam and China).
- Research on marine resources: the biology of Inhaca Island, Mozambique.
- Marine research: ecological and physiological studies of coastal marine ecosystems.
- Research into the ecological significance of tropical benthic fauna in mangrove forests.

4) Water resources, aquaculture

- Environmental studies in the Okavango Delta, Botswana.
- Development of small-scale aquaculture at the Asian Institute of Technology.
- Development of aquaculture and water resources management in southern Africa, through ALCOM.

5) Arid/semi-arid regions

- Regional research and education programme in East Africa, including MSc course, focusing on sustainable use of biological diversity in arid/semi-arid regions.
- Research into human–land relationships in semi-arid regions of Tanzania.

6) Biodiversity in general

- Establishment of an information centre at the Instituto Nacional de Biodiversidad (INBio) in Costa Rica.
- Inventories of the flora of Ethiopia.
- Inventory of the flora of Somalia.
- Research on landscape ecology and ecological restoration in central Ethiopia.
- Society for Promotion of Wastelands Development, India.
- International Foundation for Science.

7) Support to NGOs – capacity-building, opinion-forming and policy work

The funding given to the following organizations includes significant components promoting the conservation and sustainable use of biodiversity:

- Genetic Resources Action International (GRAIN) – genetic resources and biotechnology, policy development.
- World Conservation Union (IUCN).
- International Institute for Environment and Development, including 'Hidden Harvest', a project focusing on wild food resources.
- As a joint World Bank-IFPRI-Sida/SAREC project, genetic resources policy research on intellectual property rights relating to genetic material.
- Support to non-governmental environmental organizations through the Swedish Society for the Conservation of Nature.
- World Wide Fund for Nature (WWF).
- Support to non-governmental environmental and development organizations through Future Earth.
- Support to the Centre for Science and Environment, India.

8) Internal policy development work

Since 1992, the following activities relating to policy and strategy issues, relevant to the promotion of biodiversity, have been undertaken or initiated:

- Guidelines on activities relating to biodiversity were adopted in 1994.
- An Action Programme for Sustainable Development was adopted in 1996.
- A broad-based study on food security in eastern and southern Africa was carried out in 1995/96.
- Sida's seas and coastal zones initiative (in preparation), to elaborate (1) a policy/action plan for Sida; (2) guidelines on projects with impacts/potential impacts on sea areas and coastal zones; (3) proposals for tangible activities relating to seas and coastal zones (focusing on eastern and southern Africa and south-east Asia).
- Guidelines on environmentally sound energy assistance were adopted in 1997.
- Guidelines on activities relating to forestry were elaborated in 1997.
- A strategy on trade and the environment began to be prepared in 1997.
- Sida's guidelines on environmental impact assessment are being revised in 1997.
- Guidelines on activities relating to agriculture began to be prepared in 1997.

In addition, in 1998, a strategy for biodiversity activities in the medium term (3–5 years) and an action plan for 1998 and 1999 will be adopted.