

Austrian Implementation Strategy
for the Convention on Biological Diversity

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Introduction

Over most of its history, mankind was at the mercy of natural forces. Human beings were therefore on the same level as all other components of biological diversity and were subject to natural selection processes. Today, mankind has transcended this stage in many respects. Our natural environment and therefore biodiversity have been decisively altered by human activity; from the ecosystem perspective, these impacts have been overwhelmingly negative. While biodiversity in Austria generally increased during the course of cultural evolution, the advent of the industrial age was accompanied by often dramatic losses in biological and landscape diversity.

The negative anthropogenic impacts on biodiversity are reflected in accelerated species loss on the global level, in the destruction of natural habitats, in the ever smaller surface areas being farmed according to environmentally compatible, sustainable methods; in the abiotic realm, this is reflected in increased pollutant loads, above all of substances responsible for acid rain, projected climate changes or the "ozone hole". The broad range of emissions (dust, noise, exhaust gases) ultimately represents a threat to mankind itself.

In light of today's knowledge on evolutionary and ecosystem processes, there is consensus that biological diversity is crucial for the well-being and survival of the human race. Human beings can learn much from the manifold solutions that nature has evolved to overcome problems. Currently, a wide range of measures and technological improvements represent the first step in combating the loss of biodiversity. Combining these numerous individual measures into an overall concept, which should ultimately incorporate all of man's activities, is considered to be a key step toward preserving biological diversity.

The United Nations Conference on Environment and Development (UNCED) in 1992 adopted the Convention on Biological Diversity, the Climate Convention, Agenda 21, the Rio Declaration, and the Forest Declaration. It therefore represented a top-level, international milestone in the direction of sustainable development. Austria attaches greatest importance to these initiatives. The goal must be to ensure a harmonious relationship with nature and a benign use of biological resources; this relationship must take our present needs and the needs of future generations into consideration. Such a harmonious form of economy, which is sustainable over the long term, needs to be based on closed cycles and regenerable or renewable raw materials and energy and requires "wise use" of natural resources. A prerequisite for attaining this goal is its general public acceptance. A first step in this direction was the ratification of the Convention on Biological Diversity (BGBl.Nr. 213/1995).

The National Biodiversity Commission was entrusted by the Federal Ministry of Environment, Youth and Family to coordinate and harmonize the numerous activities and programs as well as to promote the flow and exchange of information. This commission is composed of representatives from administrative departments (Federal Ministries and Provincial authorities), unions and management, science and non-government organizations (NGOs). In addition to publishing the First Austrian National Report in 1997, this commission is also responsible for the present "Strategy" - in compliance with

Article 6 of the Convention on Biological Diversity - to implement the letter of the Convention. An important future task of the National Biodiversity Commission will be to evaluate, improve and update the strategy based on the dynamic, evolutionary progress in this field.

Above all, environmental policy requires systems thinking and action. A primary goal must therefore be to integrate environmental policy in all political levels. The National Environmental Plan (NUP) was specifically formulated under the supervision of the Federal Ministry of the Environment in order to develop goals, strategies and measures to this end. It is founded on the principle of sustainable development and has been approved by the Federal Government as an ecological guideline. The NUP already encompasses some of the goals and activities necessary to implement the Convention on Biological Diversity. Examining and possibly expanding the NUP with regard to its relevance in fulfilling the Convention is one strategy for placing its goals in a broader perspective. One such task outlined in the Convention is to incorporate the preservation and sustainable use of biological diversity into the relevant sectoral and integrated programs and plans. In this connection, more emphasis must be placed on the sector development and aid. Austrian environmental policy has placed major emphasis on fulfilling the so-called "Toronto goal" (20% reduction of CO₂ emissions by the year 2005, based on 1988 levels). In addition, Austria waived its right to use nuclear energy by passing a Nuclear Ban Law (BGBl.Nr. 676/78, Ban on the Peaceful Use of Nuclear Energy). Ever since the Chernobyl reactor disaster, Austria – as one of the countries severely affected by fall-out – has pursued an active anti-atom policy. Austria's policy goal is to create a nuclear-free zone in Central Europe.

The underlying intent behind the present National Strategy to protect and sustainably use biological diversity is to strengthen awareness and to provide information on the necessity, advantages and benefits of biodiversity; the vehicle is education and training in all relevant sectors. A second primary goal is an interdisciplinary attempt to inventorize Austria's biodiversity on all levels, i.e. genetic diversity (especially in agriculture and forestry), species diversity, and ecosystem diversity. Setting coordinated, cost-effective measures based on objective priorities requires the appropriate information. In the sense of the precautionary principle, however, appropriate measures to protect and sustainably use biodiversity must be initiated now, before final, complete data sets are available.

A further aim of the present strategy is therefore to better coordinate measures in the realm of nature conservation and species protection in Austria. This also encompasses neighboring countries both in and outside the EU as well as nature conservation, agricultural and forestry policies that are in tune with the three goals of the Biodiversity Convention. A coordinated and intelligent regional planning along with scientific and technological innovation are cornerstones of this process.

The first step toward a coordinated strategy involved a cooperative effort by the European Conference of Environmental Ministers, who initiated a "Pan-European Strategy for Biological and Landscape Diversity" in 1995.

Austria's efforts to protect biodiversity go beyond the national and European level (where major impulses are provided by the relevant EU guidelines) to encompass

activities on the global scale. This includes active participation in the framework of CITES, the Bern Convention, the Ramsar Convention, and the protection of marine mammals.

The goals and measures outlined in this strategy in no way represent a prejudication for the allocation of additional funds.

1 Preservation of biological diversity

Present situation

Austria's range of landscapes is among the most diverse in Europe. The breakdown into small-scale habitats yields a relatively high number of autochthonous animal and plant species. According to most recent knowledge, Austria (total surface area ca. 84 000 km²) harbors approx. 2900 fern and flowering plant species, 88 mammal species, ca. 36 850 insect species, and 813 plant associations. In a number of species and species groups, especially invertebrates and cryptogams, our current state of knowledge is insufficient to make definitive statements about the diversity of the fauna and flora.

Due to gaps in the systematic surveys, no complete overview of the biodiversity of wildlife or of farm animals can currently be provided. Internationally, Austria has developed a relatively high degree of awareness for the necessity of preserving biodiversity and has had some resounding successes in the realm of nature protection and landscape preservation. Nonetheless, a considerable portion of our native species and habitats have either already been lost, are threatened with extinction, or are endangered. For example, ca. 38% of the ferns and flowering plants, ca. 57% of the breeding birds, and nearly 50% of the mammal species are threatened in one form or another. Among the various habitats, both remnants of natural ecosystems and extensively exploited elements of cultural landscapes are threatened. The former are endangered largely through exploitation interests, the latter either through intensified use or altered or abandoned usage.

In order to protect and preserve biodiversity, Austria has joined a series of international agreements beyond the Convention on Biological Diversity; these include the Alpine Convention, the Bern Convention, CITES, and the Ramsar Convention. As an EU member, Austria is also obligated to implement those Community regulations that pertain to biodiversity. An important aspect is that, according to the Austrian Federal Constitution, legislative sovereignty and enforcement powers in the realm of both nature conservation as well as hunting and fisheries fall under the jurisdiction of the Federal provinces.

Numerous measures designed to preserve biological diversity are being implemented based on various national and international legal principles. Approximately 25% of Austria's territory are classified as protected areas under one of several qualitatively differentiated protection categories. Moreover, certain habitats are under general protection based on laws of the Federal provinces (ex-lege habitat protection of aquatic ecosystems, wetlands, alpine regions, etc.) In addition, a number of habitats are protected by contracts (natural forest reserves, orchards, water meadows, semi-natural grassland formations).

In Austria, gene banks designed to collect and preserve genetic resources of agriculturally and silviculturally utilized plants and animals have been installed in various public institutions over the past 30 years. Breeding and species conservation efforts as well as international exchange programs are being conducted in zoos, botanical

gardens, national parks, as well as private societies; these are primarily devoted to wildlife species, but also to domestic breeds.

1.1 In-situ preservation

Goal (legislative/institutional)

Principally, the goal is to achieve in situ protection, although in reality ex-situ measures are often necessary. This requires actively coordinating in-situ and ex-situ measures.

- Sanctioning, evaluating and, when necessary, improving the legislative and institutional framework to more efficiently protect biodiversity.

Measures

- Consider nature conservation and landscape protection as integrated issues relevant to a wide range of legal entities (e.g. regional planning, agriculture, transportation)
- Harmonize all legal regulations relevant to biodiversity
- Improve national and international cooperation (i.e. consider Austrian membership in the Bonn Convention and its agreements) as well as implement international agreements relevant to biodiversity on a national level.
- Examine and, if necessary, modify laws that affect biodiversity in the light of the Convention on Biological Diversity
- Examine and modify subsidies to reflect the needs of biodiversity

Goals (programs/prerequisites for protecting biodiversity)

- Establish the scientific and technical basis for a satisfactory and representative protection of biodiversity in Austria
- Safeguard biodiversity in and outside of protected areas by preserving existing protected areas and creating new protected areas as the need arises
- Avoid negative impacts on natural and near-natural ecosystems by developing nationwide, tiered conservation concepts that incorporate buffer zones and corridors
- Secure viable populations of endangered animal and plant species, crop plant varieties and domestic animal breeds

Measures

- Continue biotope mapping based on nationally valid criteria and develop landscape conservation plans that enable the designation of areas with high nature conservation potential
- Safeguard and manage protected areas (for example the natural forest reserve program) by
 - designating buffer zones
 - formulating, implementing and monitoring management measures
 - establishing suitable management facilities
- Expand gene bank forests, establish a representativeness over all forest associations, forest ecoregions and altitudinal zones
- Develop species protection programs (for all endangered species on the Red List) and establish uniform guidelines for releasing animal and plant species

- Formulate or update the Red Lists of endangered species (including crop plants and domestic animal breeds) and endangered habitat types in Austria

Goals (financial)

- Appropriate sufficient funds and personnel to implement measures in nature conservation and species protection sector
- Determine full costs for consumptive uses of nature and landscapes and for nature degradation

Measures

- Full and effective use of existing funds on the national and EU level, especially by improving interdisciplinary cooperation
- Motivate the private sector to fund biodiversity-relevant projects (e.g. nature sponsoring)
- Increasingly internalize external costs for the consumptive use of nature
- Secure funding for measures that preserve biodiversity

1.2 Ex-situ preservation

Goals (legislative/institutional)

- Preserve the genetic resources of crop plants, domestic animal breeds and wild animals and plants by creating appropriate legal and institutional frameworks

Measures

- Legally anchor the preservation of endangered native species, breeds or races of plants and animals in gene banks, botanical gardens or zoos
- Establish systematic safety duplications of varieties and breeds stored in gene banks
- Sustain (maintain and replace) and possibly expand clone archives and seed orchards
- Establish a central coordination office for ex-situ preservation

Goal (Improve our state of knowledge on endangered species)

- Create the scientific/technical basis for work on issues such as the dissemination, degree of threat, and preservation of varieties, breeds and species; appropriately archive endangered varieties, breeds and species in gene banks, gardens and zoos

Measures

- Nationwide network of ex-situ data banks (i.e. for endangered farm animals, fruit varieties)
- Compile data on ex-situ preservation methods for wildlife

2. Sustainable use of biological diversity

2.1 Agriculture

In 1987, Austria formulated an ‘ecosocial manifesto’. This provided the intellectual foundation for a re-orientation of the nation’s agricultural policy. The ecosocial agricultural approach derived from this manifesto is designed to introduce environmentally sound farming practices nationwide and to preserve the typical small farms that characterize Austria’s landscape (70% of the farms are smaller than 20 ha). Furthermore, this approach recognizes the wide-ranging role that the agricultural sector plays: beyond producing traditional food items, it contributes to preserving the soil, water, species diversity and landscape structure. This is a cornerstone in providing Austria’s diverse aquatic habitats and landscapes with the special protection they require.

The transition of the agricultural sector over the past few years is characterized by a drop in the use of fertilizers and crop protectants, the increased use of integrated farming systems, improved crop rotation using alternative and specialty crops, and the promotion of “biological” animal husbandry. This is reflected by an internationally unrivaled increase in the rate and overall number of farms operating on biological principles. The goal is to preserve genetic diversity in situ in the original habitat or ecosystem. Should this prove impossible or should a species be threatened with extinction, then ex-situ measures must be taken. At the same time, this approach should in no way hinder natural evolutionary processes.

The preservation of biodiversity in culturally derived species and breeds is inseparably coupled to commercial exploitation. Dropping demand or abandoned traditions tend to disrupt the evolution of crop plants and domestic breeds. Absolute priority must be given to in-situ or ex-situ preservation, whereby in-situ preservation requires supporting measures and corresponding inputs.

2.1.1 Farm animals

Cattle

The following autochthonal cattle breeds are considered to be endangered:

- Original Braunvieh
- Original Pinzgauer
- Tiroler Grauvieh
- Jochberger Hummeln*
- Tux-Zillertaler Rind
- Waldviertler Blondvieh*
- Kärntner Blondvieh*
- Murbodner*
- Ennstaler Bergschecken**

* probably less than 200 dams

** only cross animals probably remain

Cross-breeding programs have been initiated to increase milk production in Braunvieh and Pinzgauer. The populations of pure Austrian genetic stock are considered threatened today and many old blood lines have already been lost. The only endangered cattle breed with an ongoing breeding effort is the Tiroler Grauvieh.

The remaining populations of endangered cattle breeds are currently under the auspices of animal breeding organizations in the Federal provinces. Specialized breeding organizations exist only for the Pinzgauer and Tiroler Grauvieh. The remaining breeds are incorporated in various breeding organizations, all of which are organized under the central Arbeitsgemeinschaft österreichischer Rinderzüchter (ZAR). In the framework of the ÖPUL program, the keeping of endangered cattle breeds is subsidized with management and breeding bonuses. Unfortunately, these subsidies are not linked to following prescribed mating plans, thus potentially enabling a breed to become genetically impoverished and increasingly inbred despite stable population sizes.

Goals

- Ensure that the diversity of breeding lines for the Pinzgauer and Grauvieh is preserved
- Increase the populations of the other races while maintaining maximal heterozygosity

Pigs

The following breeds of pig are considered to be endangered in Austria:

- Mangalitzaschwein, all color strains
- Turopoljer Schwein
- old Austrian lines of the Styrian Edelschwein

Pig farming in Austria is virtually entirely based on the breeds österreichisches Landschwein, österreichisches Edelschwein and Pietrain for commercial cross-breeding purposes. This is accompanied by a number of hybrid breeding programs that use the breeds Duroc, Large White and Yorkshire in order to produce more stress-resistant sows. In all cases, the breeding objective is to produce thrifty, stress-resistant piglets with marketable lean meat. The meatiness demanded by the market can currently only be achieved using stress-prone, extreme meat breeds as sires and sows with an acceptable meatiness. The characteristic traits of old pig breeds – late maturity, long period of exploitation, good weight increases under suboptimal feeding conditions, ability to be held as free-ranging animals, and top-quality meat with moderate to high fat cover – all contribute to their current poor marketability.

Small populations of the first two above-mentioned breeds are being held by enthusiasts in animal parks; nonetheless, only rudimentary breeding programs exist.

The österreichischen Edelschwein is a special case. A larger population of pedigree animals is present; some are being pure-bred, while others are being cross-bred with Landschwein to produce gilts. In order to accelerate the genetic gain in the sense of a higher percentage of lean meat, foreign blood lines are increasingly being cross-bred with the native Edelschwein population. This displacement crossing has progressed to the point where the original Styrian Edelschwein must be classified as endangered. There are currently no ex-situ held stocks of genetic material of pigs.

Goals

- Establish stable breeding populations of endangered pig breeds
- Create a market for specialty products

Sheep

The following autochthonal sheep breeds are considered to be endangered:

- Montafoner Schaf
- Tiroler Steinschaf
- Braunes Bergschaf
- Kärntner Brillenschaf
- Krainer Steinschaf
- Waldschaf

Whereas the larger sheep populations are mainly composed of Bergschaf (as maternal material for commercial cross-breeding with mutton sheep) or Ostfriesisches Milchschaft, hobby keepers often show great interest in old and endangered breeds of sheep.

Due to the increased interest in sheep breeding, the populations of all endangered sheep breeds can be classified as stable or increasing. Unfortunately, breeding programs designated to avoid genetic impoverishment are still the exception (Krainer Steinschaf).

Goals

- Ensure that the diversity of all breeding lines is preserved
- Enlarge the population of other breeds while maintaining maximum heterozygosity
- Sustainable use in the framework of cultural landscape conservation (especially alpine regions)

Goats

The following goat breeds are considered to be endangered in Austria:

- Gemsfarbige Gebirgsziege
- Pinzgauer Ziege*
- Tauernscheckenziege
- Toggenburger Ziege*
- Saanenziege**
- Strahlenziege***
- Pfauenziege***
- Steirische Scheckenziege***

* Scientific study currently being carried out to determine the degree to which the two differ

** Breeds do not originate in Austria

*** Studies currently commissioned to determine the degree of threat to these breeds

Goal

- Establish stable breeding populations of autochthonal goat breeds

Measures pertaining to the above-mentioned animal species

In order to preserve the available genetic material, a gene bank for endangered domestic breeds was established on 1.1.1997 by the Federal Ministry of Agriculture and Forestry; it is designed to store sperm and embryos.

- Survey and centrally register as many of the remaining animals and their ancestry as possible
- Determine pure breeds and potential contribution of foreign genes by studies using marker genes
- Formulate mating and breeding programs
- Tie subsidies to strict adherence to a mating program
- Determine the genetic distance between individual breeds and strains
- Store sufficient sperm and embryo material in the gene bank
- Determine the performance potential of endangered breeds compared with the main breeds under comparable (extensive) conditions
- Participate in international projects designed to study the genetic diversity of farm animals
- Investigate the suitability of endangered pig breeds for biological (green) farming
- Investigate the suitability of endangered goat and sheep breeds in the landscape maintenance sector

Horses

The following horse breeds are considered to be endangered in Austria:

- Noriker
- altösterreichisches Warmblut*
- Shagyaaraber
- Lippizaner

* probably only cross-bred animals remain

Horse breeding is currently entering a new era. While the breeding of Noriker and Haflinger is largely in the hands of farmers, the remaining breeds are mainly kept and bred by non-farmers for sport and recreation. Lippizaner breeding is largely carried out by the state stud-farm in Piber. This is supplemented by a number of smaller breeding groups in private hands. No information is currently available about breeding efforts for the altösterreichisches Warmblut. The few mares with predominant altösterreichisches ancestry are covered by stallions with non-Austrian bloodlines. In the case of Shagyaaraber, pure breeding is the rule, although no specific population planning to preserve the diversity of lines is being conducted. Austria is home to a recognized breeding organization for Arabian horses. Noriker are often bred as farm animals for meat. This can have negative implications if the breeding objective is an agile, lighter, cold-blooded horse.

A sperm bank is currently being set up to promote the ex-situ storage of genetic material.

Goals

- Establish a stable breeding population of endangered breeds
- Use as farm animals, in tourism and for recreation
- Recognition that Austria's horse breeds are a part of the country's cultural heritage

Measures

- Survey and centralized registry of all animals along with their ancestry and breeding history
- Establish mating and breeding programs
- Promote horse breeding on farms by subsidizing mares participating in mating programs
- Store sufficient sperm material in the gene bank
- Determine the performance potential of endangered breeds compared with the main breeds under comparable conditions
- Investigate the potential of endangered breeds for special use in maintaining landscapes, in forestry and tourism

2.1.2 Bees

Both races of European honeybee are autochthonal in Austria

- Carnica and
- Mellifera.

Carnica has been bred and selected in Austria for decades under the strictest internationally recognized criteria (Austria plays a leading role in these breeding programs). Since Austria is globally viewed as the natural habitat of Carnica, in-situ conservation measures of the gene pool have priority. While an ex-situ preservation in tiny populations is principally feasible, it would reduce the diversity of genetic resources, whose importance still remains to be determined.

Goals

- Ensure the preservation of the local traits of the races Carnica and Mellifera throughout Austria

Measures

- Survey and map local traits based on morphological, genetic (fingerprinting) and behavioral criteria using selected random samples
- Current inspection procedures focus largely on a single morphological feature (cubital index). Nonetheless, the great variability of this character recorded by the BFL's Institut für Bienenkunde in July 1997 indirectly demonstrates strong changes in naturally evolved behavior. Scope: the government livestock census is a potential vehicle to survey of the overall number of honey-bee colonies. This would encompass ca. 400 000 honey-bee colonies and 30 000 bee-keepers
- Organize inspections to go beyond the selection for mating purposes
- Conduct fingerprinting for genetic identification
- Compile a "behavior catalogue" to describe the characteristic features of ecotypes

- Integrate these activities in international projects to preserve biodiversity, e.g. “Conserve the European Dark Bee”
- Application according to VO EWG Nr. 1467/94 (Action Programme of the European Union: Preservation, Description, Collection and Use of Genetic Resources in Agriculture)
- Secure and expand the current type localities and areas with pure-bred bees
- Safeguard Austrian populations through legal and practical measures at the national and international level
- Educate and train bee-keepers with special emphasis on the above issues; rely on existing organizational structures of bee-keeping societies and the bee-keeper schools in the Provinces

2.1.3 Agricultural and horticultural plants

Scope

- agricultural and horticultural plants including wild-growing forms
- medicinal, herbal and non-food plants
- ornamental plants that are being cultivated
- useful wild plants
- soil protection

Present situation

Austria's total arable land amounts to 3.5 million ha, of which 1.4 million ha is plough-land. The number of farms has been estimated at 267 000, whereby 20 000 are classified as biological farms and 99 000 as hill farms. Approximately half of the biological farms (50 000 ha or 3.5% of the total plough-land) are arable farms.

Up until 1930, native varieties predominated almost without exception. Today, they are increasingly being replaced by grafted varieties and the first newly bred varieties. This displacement process, foremost through the German assortment of varieties, continued after 1945 and was first dampened in the mid-1960s by successful Austrian plant breeding activities. Depending on the type of cultivation, the proportion of foreign varieties is about 25% today. On the other hand, it should be noted that plant breeding in Austria is based only to a small degree on autochthonal material. Comparing the overall assortment with the native varieties reveals that breeding activities have expanded the genetic basis within the assortment. This can be explained by the fact that plant breeding on the European level had access to a gene reservoir beyond that available to the evolution of native varieties. This once again underlines the importance of genetic collections and unhindered access to this material.

The landscape is an integral part of the ecosystem, one that – based on human needs – contributes to structuring the overall system. The 10 000 year history of agriculture is characterized by a constant loss of species, whereby other, new species came to be cultivated. The advent of crop plants from the New World permanently altered European agriculture over the last 400 years; this process reached its peak in the late 1960s with streamlining measures in the agroindustry and the focus on market-oriented production.

Collection size: In the agricultural sector, the collection can be considered to be complete with regard to native varieties and old breeds. It contains virtually the entire assortment of native and breeding varieties since the turn of the 20th century. Based on the collected material and that contained in the gene banks, it is unlikely that new, previously unknown gene reserves will come to light. The collection of horticultural plants is less complete; nonetheless, unrecorded gene reserves are unexpected here as well. This means that the loss of autochthonal and adapted material was much larger here.

Ex-situ preservation: Six major collections exist, 4 of them at the Provincial and Federal level (Bundesamt und Forschungszentrum für Landwirtschaft – BFL Vienna, Bundesamt für Agrarbiologie – BAB Linz, Landesanstalt Rinn, Versuchsstation Wies) and two privately operated facilities (Arche Noah, Saatzucht Gleisdorf). Material – in the form of working and base collections – is mostly available and material replenishment and documentation is taking place.

In-situ preservation: In-situ preservation exists to a limited extent in biological farming facilities and in marginally arable land. An analysis has shown a trend over the last decade for further loss of cropland planted with native and old varieties; existing native wheat varieties were almost totally replaced by triticale.

Goals

The goals are conform with those of the Global Plan of Action (unanimously adopted by all FAO member states at the 4th Technical FAO Conference in Leipzig in 1996): Preservation of Plant Genetic Resources for Food and Agriculture and their Sustainable Use.

Preservation serves three purposes:

- plant breeding
- the direct use or reintroduction into agriculture
- scientific research

Sustainable means providing a reservoir of genetic resources for agricultural and breeding purposes, along with enabling the further development of agriculture with a broad biological spectrum of varieties and species in order to achieve food security (as far as yields, quality, resistance, adaptation to existing or changing climate or environmental conditions, etc. is concerned). An important aspect is the preservation of a balanced ecosystem, which includes agricultural systems.

Activities

• Collection activities

Closing gaps in the collection: Gaps in the collection – insofar as material is still available – are to be closed through directed collecting activity or through exchanges with the international network of gene banks. Completing the collection of native material from foreign sources (or exchanges in general) are in line with the principle of the sovereignty of every state over its genetic resources and the resulting responsibility for preserving these resources. Gaps are most likely to exist in vegetables and in the ornamental plant sector.

Collection of neglected species: The collection is to be expanded to include species with potential significance for agricultural and horticultural use. This specifically refers to

species that have lost their earlier importance: wild-growing species and weeds that can play a potential role as crop plants or that may help preserve the ecological balance in agricultural/horticultural systems; it also encompasses wild-growing stock forms of crop plants and utilized wild plants.

Preservation of declining varieties: Every variety that is deleted from seed catalogues is to be deposited in the gene banks.

- **Ex-situ preservation**

Storage capacity: Suitable storage facilities are to be erected as soon as possible (long-term storage) for the gene bank in the Landesanstalt Rinn. Overall, Austria's storage capacity is considered to be sufficient. In the private sector, the Saatgut Gleisdorf also has sufficient storage space.

Backup and safety duplications: The availability of sufficient storage space makes backup safety duplications in Austria feasible. A corresponding storage plan has been developed by the operators of the state-owned gene banks. The material for the safety storage should stem from future replenishments. The issue of safety duplication in the private sector remains largely unresolved. State-owned facilities could principally offer such storage capacity. The degree to which the privately owned gene banks would take advantage of this opportunity remains to be clarified.

In vitro storage: There is only limited need for in vitro storage facilities for agricultural crop plants. Based on the considerable expense of this form of storage and the small amount of material requiring in vitro preservation, a cooperation with other gene banks in the EU or on a regional level is recommended.

Storage of wild plant seed stock: An agreement has been reached between the gene bank of the BAB Linz and the botanical garden of the University of Salzburg regarding the storage of seed stock of wild plants from endangered habitats. The aim is to plant these seeds in the wild as soon as the respective ecosystem has stabilized itself. A similar proposal for all other botanical gardens and research facilities is currently being drafted, indicating the future potential of this form of cooperation.

Core collections: In light of the relatively small and manageable collections in Austria and considering the problems involved in splitting the material up into core collections, this problem is currently not acute. As a long-term goal, however, core collections must be given absolute priority.

- **Cooperation between the private and public sectors**

This cooperation should take place on a number of levels:

Science (plant breeding, universities, various research facilities such as botanical gardens, museums, etc.)

Agriculture (consulting, subsidies, production, marketing)

Consumer level (general and special demand)

The immediate goal should be to improve the flow of information. As far as the use of genetic resources is concerned, gene banks should be fully informed about all materials supplied. The same holds true in the research sector (botanical gardens, natural science museums and research facilities), with a further aim being to improve the information network on the full range of ongoing activities.

- **International cooperation**

Participation in or continued cooperation in the following international activities is envisioned or currently in effect:

ECP/GR: Austria is currently participating in the ongoing activities of the working groups “Barley”, “Grain legumes”, “Brassica”, “Allium”, “Malus” as well as “Forages”.

European Phaseolus Data-base: Work on establishing a European databank for Phaseolus in the framework of the ECP/GR is in progress.

WIEWS: Austria is actively participating in establishing and implementing WIEWS in the FAO.

Additional participation in future projects is planned: Establishment of a “European Triticum Data-base”; regional programs under the direction of IPGRI to rejuvenate the spectrum of varieties and species.

Cooperation with other institutions: In the framework of participation in the international network of gene banks, the BAB Linz is currently involved in the safety duplication of parts of the ICARDA gene bank.

Access to material, data and scientific information: is given in the framework of the “International Undertaking”.

Measures

- **Collection activities**

Close gaps in the collection

Collect neglected species

Store varieties that have fallen into disuse

- **Ex-situ preservation**

Establish adequate long-term storage conditions at the Landesanstalt Rinn

Store material from the private sector in existing gene banks

Backup/safety duplication: reach agreement on in vitro storage

Store seed stock of wild plants from endangered habitats

Establish core collections

- **Documentation**

Data collection and data transfer, improved access to data

Characterization

Evaluation

- **Material replenishment**

Monitor the stored material and ongoing cultivation to replenish stocks

- **In-situ preservation**

Use of these materials in plant breeding

Revive the traditional assortment and species spectrum, on-farm preservation of adapted (native) varieties

Change the regulations in the Saatgutgesetz (Seed Act)

Consider in-situ preservation in future development trends

Incorporate ÖPUL in in-situ preservation

- **National cooperation**

Intensify cooperation between the private and public sector

- **Public relations**

Use the media to create public interest

Supply information and news/information brochures

- **International cooperation**

Ongoing participation in ECP/GR

Participate in international projects: FAIR project Phaselieu

Participate in WIEWS

2.1.4 Preservation of genetic resources in the Alps

Scope: grasslands, arable farms on grasslands, alpine pastures, landscaping, erosion prevention

In-situ preservation

In situ preservation should be the primary form of preservation of genetic resources in grassland areas. Other measures such as ex-situ preservation should only be taken when in-situ preservation is ineffective or the preservation of certain species (diversities) appears endangered.

Delimitation of the operative area:

The operative area principally encompasses permanent grasslands. Regions that do not fall under this definition but whose protection is desirable based on other considerations (nature conservation) can be included here. Diversities must also be ensured by in-situ preservation. Reaching this goal will require going beyond the level of the plant association to document, examine and preserve each individual species along with its various types (biological diversity).

Activities:

In-situ preservation should primarily focus on the wild or wild-growing forms of the various species. The species spectrum should be restricted only in the sense that the included forms should play some role (not necessarily commercial) in permanent grasslands. Plant diversity is coupled with farming activities and must always be seen in this light.

Important considerations include the definition of plant associations (including anthropogenically influenced or induced communities) and their status (protection status) as well as the development of measures designed to achieve the aims outlined in the present “Strategy” document. A prerequisite for this is to compile the mapping efforts, surveys, and other research results of the Bundesanstalt für alpenländische Landwirtschaft Gumpenstein, the Universities of Vienna, Salzburg and Innsbruck, the Landesanstalt Rinn, as well as other relevant projects conducted by universities, research facilities and Federal Ministries. A series of mapping efforts and plant community relevés has been carried out nationwide at a large number of experimental sites over the last few decades. Defining the plant associations that require protection measures calls for a multi-step effort to survey the status quo situation and to use this information to implement appropriate measures.

Ex-situ preservation

Ex-situ preservation is appropriate whenever in-situ measures prove to be ineffective or fail entirely and immediate action is called for. The goal of ex-situ preservation is to safeguard varieties and parent forms of various species that play or played a role in Austria’s grassland habitats (or in the other systems listed), yet whose future survival appears threatened by trends in the seed market.

Measures

- **Definitions and surveys**

Define the plant associations in the affected regions

Provide a scale to express the rarity of selected plant associations and the level of urgency for their preservation

Document the status quo of plant associations worthy of protection by combining the results of existing surveys

Conduct directed, new relevés in specially selected study areas in order to detect trends in plant associations need strict preservation measures

Define the value of these associations in light of the goals of the present strategy concept

Define the corresponding farming practices (related to grassland and hill farming) that need protection

Determine potential future threat scenarios, accompanied by considerations on how to avoid them (tourism, recreation, agro-policy, etc.)

Elaborate counterstrategies or formulate specific demands for the in-situ preservation of endangered plant associations, species or even biotypes (for example using ÖPUL 2000 or other instruments)

- **Ex-situ preservation**

Document all important varieties of grasses and legumes in alpine grasslands based on experimental results with varieties over the last 10 years

Compile a list of varieties that require ex-situ preservation; collect varieties; store and preserve the material; ongoing documentation of additional varieties that need protection

Collect and preserve native or farmyard varieties (golden oat-grass, genetic material from red clover from collections in the 1950s)

Collect special species or biotypes in the wild in the event of acute threat

Collect, in the wild, genetic resources of exploited wild species such as gentian, masterwort, spike-nard, arnica, etc.
Establish computer-aided data management for ex-situ preservation; make data available to international networks
Monitor and renew the stored material
Implement measures to reintroduce regionally adapted, valuable species and varieties in initial plots (forest paths, road embankments, landscaping, reseeded of extensive grasslands)

2.1.5 Fruit

Present situation

The most extensive survey of varieties in Austria is the one initiated in 1981 in Upper Austria, even though the map still contains many blank areas. Over the last few years, efforts have been intensified in Lower Austria, Carinthia, Styria and Burgenland. Based on the surveys conducted to date, the stock of remaining varieties in Austria is roughly estimated at around 3000. Most fruit varieties are located in situ in farm orchards. They are primary crops and therefore preserved.

Goals

Collect, preserve, document, characterize and evaluate as many varieties as possible, the aim being to ensure the long-term survival of the gene pool of fruit varieties

Measures

- **Intensify mapping efforts**

- **Intensify the characterization, evaluation and documentation of varieties**

Create a standardized description and evaluation system

Expand descriptions to include biotechnologically and nutrition-physiologically relevant ingredients

Expand the evaluation to reach the decision: preservation yes/no

Computer-aided documentation of varieties in the pomological stations

Central data collection at the BOKU Vienna - Obstbauinstitut

- **Preservation of varieties**

Formulate a national program to preserve varieties both in situ and ex situ

- **In-situ preservation**

Formulate draft agreements for in-situ preservation based on the Swiss model

Fully utilize subsidies for orchards, new plantings, etc.

Compile lists of varieties that are recommended for the individual regions and whose protection is a priority

- **Ex-situ preservation**

Select areas to survey and evaluate varieties in future mapping efforts

Compile a “Red List” of rare, highly endangered varieties (a demand made by the Malus-Pyrus group of IPGRI)

Determine the possibilities of safety duplications for highly endangered varieties, both nationally and internationally

- **International cooperation**

Austrian participation in the Malus-Pyrus group of IPGRI

Austrian participation in establishing a European Malus-Pyrus databank in the framework of ECP/GR

Exchange of budwood, experience and data with foreign gene banks

Ex-situ preservation of state-owned fruit gene banks in Austria, status 1997

Gene bank	Number, varieties, mutants, subgroups, wild species (clones)							Total
	Apples	Pears	Cherries	Prunes	Apricots	Peaches	Berry fruits	
Klosterneuburg	426	52	80	38	21	32	86	735
Wien	66	25	89	-	44	-	-	224
Haidegg	250	54	-	-	1	-	-	305
Linz	101	83	4	26	2	3	-	219
St. Andrä	75	-	-	-	-	-	-	75
Total	918	214	173	64	68	35	86	1558

2.1.6 Grapevines

Present situation

In practice, vines are reproduced exclusively by vegetative means (= cloned). The development of new varieties through chance crossing is improbable compared to historical times. This is due to the grape louse, to grafting techniques as a biological strategy to combat grape louse damage, and to mechanical soil tillage. The increasingly narrow range of varieties (each with a correspondingly strong demand) is a market-based reality.

Within the next three decades, the plants of all Austrian viticultures (currently ca. 50 000 ha or 150 million plants) will most likely be reduced to only a few genotypes. In the event of new biotic or abiotic stress factors, this could lead to large-scale damage of catastrophic proportions. Preserving genetic diversity provides an opportunity to promptly find, reproduce and introduce resistant genotypes. The expenditures for preserving genetic diversity therefore primarily serve to protect the future of wine-growing and only secondarily have archival character.

Goals

- The collection should focus on obtaining remaining specimens of traditional native grape cultivars found in Austrian wine-growing regions and used as ornamental vines throughout the country
- Document the genetic spectrum of commercially important main varieties (clone collection)
- Give priority to collecting wild forms of *Vitis silvestris* growing in situ in Austria

Measures

Clearly, the endangered grape cultivars do not fulfill the current commercial criteria, especially from the viticultural perspective and/or based on product quality (analytical and/or sensory). Otherwise these varieties would be widely distributed. This also explains why they are not approved for cultivation or to produce quality wines. Under altered environmental, cultural or market conditions, however, it is conceivable that certain varieties or even only specific traits could gain great importance, making their large-scale use economically viable. This could also apply to individual, currently unused clones of classified grape cultivars.

- Use in breeding clones
- Use in cross-breeding
- Use in the framework of breeding measures using molecular biology techniques

2.1.7 Cultural landscape

Legal framework

Flurverfassungsgrundsatzgesetz (BGBl.Nr. 103/1951 i.d.g.F.) as well as cadastral laws of the Provinces. Land reform is under Federal jurisdiction in the framework legislation and under Provincial jurisdiction as far as implementing regulations and enforcement is concerned (Art.12, Abs. 1Z.3 B-VG).

Present situation

Austria's central location in Europe, which is characterized by well-developed climatic gradients (West-East, North/South) and the landscape-determining mountain chains of the Alps, yields very heterogeneous cultural landscapes. The various usages, particularly farming, highlighted the highly differentiated landscapes (e.g. alpine region) or exaggerated them (e.g. Pannonian realm).

The network of human settlements, aquatic ecosystems, roads, fields, meadows and forests - and their strong intercalations - produce an exciting hologram of the landscape. In this mosaic, ponds, residual surfaces, idle land, and embankments form crucial components and refuges for many endangered species. Mankind's thirst for action and rational use, along with our technical arsenal, present a constant threat to such sites. Those who, over the years, repeatedly revisit particular landscapes are confronted at every step with the gradual loss or devastation of sites we disparagingly refer to as derelict patches or morasses. There is often no legal basis for immediate protection, and the owners need to be made aware of the value of such refuges virtually on a daily basis.

In the 1950s, a number of instruments were developed to improve the agricultural structure; of these, land consolidation proved to be the most significant. Especially on prime land, this provided farmers with uniformly arable, easily accessible, machine-harvestable fields. Technological-engineering measures (draining, clearing, leveling) allowed fields to become "fully arable" and transformed marginal land such as rough grazing sites, hollows, embankments and wet meadows along rivers and streams into productive farmsites.

In the framework of the current nationwide effort to restore the ecological balance of agricultural land, such land consolidation measures and parceling could be used as a value-free, effective strategy to repair damaged ecosystems. Such land measures are crucial both for species conservation and for preserving a diverse agricultural landscape. The type of implementation determines whether such strategies reduce biodiversity (by removing trees and bushes that are "in the way", large-scale draining, regulation and "corrective" measures) or increase diversity (preservation and replanting of trees and hedgerows, conservation of residual surfaces and wetlands).

In some Provinces, documenting the ecological status quo is mandatory in every property evaluation, comparable perhaps to the ecological target status in the framework of landscape planning. In practice, the (ecological) quality of a land consolidation effort depends on the persuasiveness, the skill and the fantasy of the agricultural authorities.

Goals

In the future, measures designed to improve the agricultural structure must place more emphasis on agro-ecological aspects such as maintaining the biological balance and biodiversity. The ecological goals include preserving or improving the number and diversity of biotopes in cultural landscapes (biotope networks, preservation of near-natural areas); these activities have a positive impact on the species spectrum, microclimate, water retention capacity, and soil structure of agro-ecosystems. Preserving and subsidizing various structural elements in landscapes helps create new habitats that can be colonized by a wide range of animals and plants. This is also a step toward preventive plant protection: it provides habitats and food for beneficial

organisms. As long as the relationship between beneficial and harmful species (or better: between predators and prey) in agro-ecosystems remains balanced, the threat of a population explosion in any one species is minimized.

Biological farming gives special consideration to the above issues and attempts to maintain the biological balance and original food webs (preventive plant protection, diversified crop rotation, preservation and improvement of soil fertility and soil activity). This form of agriculture will therefore play an important role in implementing the above goals.

A major interim goal on the path to a varied cultural landscape is the preservation and promotion of transitional areas (buffer zones, high-quality ecological sites). These ecotones between different landscape types are often characterized by a greater range of niches (food, habitat, climatic conditions) than in the adjoining, more uniform landscapes. Beyond having mixture of species from each of the adjacent landscapes, such transitional zones contain their own, characteristic species. As far as biodiversity is concerned, ecotones are particularly valuable in agricultural landscapes.

Measures

- Amend the Flurverfassungsgrundgesetz (Federal Law) and the corresponding cadastral laws at the Provincial level to make ecological measures binding
- Factor the concerns of nature-, species- and landscape protection into agricultural law, including the issues addressed in the EU Bird Protection Directive and the FFH Directive
- Step up efforts to make the preservation and promotion of biodiversity in cultural landscapes a part of all land reform measures
- Establish directed programs to preserve refuge areas and to maintain the various landscape elements
- Preserve, expand and create extensively used and unimproved buffer zones between different landscape types; this includes buffer zones bordering semi-natural landscape elements such as forest edges, aquatic ecosystems, hedgerows, semi-natural grassland formations
- Define regional models for pristine cultural landscapes to help ensure that agricultural practice adheres to site-specific conditions

2.1.8 Biodiversity of non-crop species in agroecosystems

Present situation

- Soil organisms (edaphon)

The density and abundance of soil organisms depends strongly of the type of tillage, the crop rotation strategy, the intermediate crops, the type of fertilizer and pesticide application, etc.

Biological farming has made it an official goal to preserve and, under suitable circumstances, to improve the fertility and biological activity of the soil (EU Regulation 2092/91, Appendix I). The following measures are foreseen here:

- Cultivate legumes, green manure plants or deep-rooting plants in an appropriate, broadly set crop rotation
- Incorporate composted or non-composted organic material stemming from facilities that adhere strictly to the provisions of the above regulation

The number of soil organisms is site-dependent, with healthy soils containing a high species diversity. The following factors must be abundantly available in order to provide optimal conditions for soil organisms:

- Habitat (by preventing compaction, ensuring ground cover for as long as possible, mechanical hoeing)
- Food (in the form of root mass, green manure plants, crop residues, manure)
- Time for reproduction (by allowing the soil to rest and careful tillage)

Note that improving the soil fauna and its diversity not only promotes nature conservation, but can also be profitable for agriculture. A balanced and active soil fauna stabilizes the soil (biological engineering, good crumb structure) and therefore protects against erosion. Plant growth is also promoted by the wide range of soil organism activities such as mineralization, humification, atmospheric nitrogen fixation, etc.

- The associated field flora

A recent study on the field weed vegetation in Austria revealed a decreasing trend in the number of species. The mean number of species in winter cereal in the Weinviertel, for example, has dropped by half in the last 20 years. On the other hand, the former diversity was retained along field margins. The situation is even more precarious in summer cereals: on average, less than 10 species were recorded here.

Numerous studies in Austria, Germany and Switzerland show that a considerably lower number of plant species in conventionally versus biologically farmed fields. Herbicide-sprayed fields in the Marchfeld bear an average of 11 species, while those without herbicides contain ca. 35 species. The edges of untreated fields are also much richer in species.

- Terrestrial fauna

The abundance and diversity of many animal species is also decisively influenced by the type of agriculture practice. In many cases, we are dealing with species for which meadows and fields provide an ersatz for natural habitats that no longer exist. Wild field herbs in cultivation or along field margins are crucial for such a balanced fauna. On average, each plant species provides a habitat for 12 animal species. Herbicide application therefore impacts not only the composition of the flora, but also that of the fauna. The biomass of insects in a field, for example, is reduced by approximately two-thirds after applying herbicides.

Agricultural strategies to promote the density and diversity of the terrestrial fauna include ensuring a high crop diversity, preserving field margins, extensive farming methods and habitat creation, targeted and well-dosed application of chemical/synthetic herbicides and fertilizers, sensible use of farm equipment, as well as preserving and maintaining structural elements in the landscape.

Goal

Preserving and promoting biological diversity in agro-ecosystems must become a priority of sustainable farming and will pay dividends to agricultural productivity by increasing soil fertility and improving the biological balance. This goal can be met by directed programs, subsidies, and particularly by creating awareness in farming communities for the value of the various elements of the agro-ecosystem.

Measures

- Programs and subsidies for agricultural measures that positively affect the biodiversity of species not subject to commercial exploitation (soil organisms, the accessory field flora, terrestrial animals)
- Increased public education and information campaigns on the value of the biodiversity of these species in agro-ecosystems

2.2 Forestry

Present situation

The commercial exploitation of Austria's forests is regulated by a number of Federal and Provincial laws that are relevant to the biodiversity issue.

On the Federal level, the key law is the Austrian Forestry Law (Forstgesetz 1975 idgF). It contains specific regulations stipulating that forest use must ensure that the influence and productive capacity of forests be maintained on a sustainable basis. Austria's forests are cared for by ca. 2300 trained forestry specialists (at the administrative level, forest enterprises, interest groups), which is equivalent to ca. 1700 ha per forest officer. Austrian law requires that every estate with more than 500 ha forest employ an officer. The forstliche Vermehrungsgesetz 1996 guarantees that only correctly labeled forest plants, seeds and plant parts reach the market.

Among the Provincial laws relevant to forest management, nature conservation laws are particularly important with regard to biodiversity.

International processes and agreements are also important in directing Austrian forestry policy. The following initiatives deserve special mention:

- The Forest Declaration adopted in the framework of UNCED seeks a global consensus on the commercial exploitation, preservation and sustainable development of all forest associations and gives equal ranking to all three issues. This declaration stresses the importance of forests for preserving species diversity
- Recommendations for sustainable forest use (including biodiversity-related issues) on the operational level are made within the Pan-European Process to Protect Forests

- The Mountain Forest Protocol of the Alpine Convention, which was penned under Austrian chairmanship, also specifies crucial goals for forest management in the Alpine states

Considering the above-mentioned legal framework, the goals of the present biodiversity strategy are largely derived from the results of current surveys on the condition of Austria's forests:

- Hemeroby of forest ecosystems in Austria (1996 study on the status quo of semi-natural native forests)
- Austrian Forest Inventory (continuous, periodic data on the impacts of silviculture) as a fundamental element for the Austrian Forest Report, which is submitted annually to the National Assembly
- Forest Development Plan (juxtaposition of exploited status with the natural condition, demand-oriented amelioration measures focused on naturalness and stability)

Goals

Increasing emphasis is being placed on the ecologically sustainable management and use of forests in timber production and other forms of forest use. The aim must be to orient silviculture to the potential pristine condition of the forest association under consideration and to ensure the stability of that forest ecosystem.

In addition, the long-term future of Austria's forests requires comprehensive measures in order to minimize the impact of external influences, e.g. air pollution. As far as biodiversity is concerned, Austria's forest policy has tailored the following "green" silvicultural principles to the aims of the Convention on Biological Diversity:

- Multi-storied forest structure, tree species composition and distribution reflecting natural conditions, integrated forest conservation
- optimal forest regeneration
- small-scale and benign forest cropping methods

Measures

Forest management requires flexibility in light of the often great variability between stands and sites. The above-mentioned principles can serve as basic guidelines.

Austrian forest policy is based largely on the results of government monitoring efforts (i.e. Austrian Forest Inventory, Forest Development Plan) and on silvicultural research. They provide vital impulses for education and training in forestry, for consulting activity in forestry matters, and for public relations efforts. The measures foreseen in the forest subsidy scheme also help promote the objectives of the Convention on Biological Diversity. Special instruments like contractual forest protection help to ensure the services provided by forestry.

Framework

The results of the hemeroby study show that most of the forests, specifically two-thirds, are in a semi-natural to moderately altered state: 25% of Austria's forests can be characterized as "natural" or "semi-natural"; 41% are "moderately altered" compared to the optimal condition. On the other hand, the hemeroby study classifies 27% as "altered" and 7% as "artificial".

The relatively high degree of naturalness exhibited by Austria's forests is particularly positive in light of the fact that such Central European landscapes are almost exclusively cultural landscapes due to human use.

In areas where insufficient naturalness requires that measures be taken, forest owners should be provided with appropriate impulses and support: advice, education and training, subsidies, and performance incentives.

- Multi-storied forest structure, natural, site-specific tree species composition and distribution, integrated forest conservation

The distribution and composition of tree species in Austria's forests is determined not only by the different types of natural locations, but also by the type of forest management. Commercial considerations explain the disproportionate amount of coniferous species; in many cases the ecological tolerance of the sites has been overstepped, resulting in corresponding damage.

The Austrian Forest Inventory shows a positive trend in the comparative figures: reduction of coniferous species and increase in the number of deciduous tree species. The result is an increase in deciduous and mixed forests.

In the past few years, a tense situation has arisen due to the threatened outbreak of forest pests; this is favored by the current weather situation and an abundant supply of brooding substrates (damaged timber after storms and heavy snowfall). This acute threat to forest stands that consist of "exotic" tree species is increasingly being accompanied by impacts on natural forests.

- Optimal forest regeneration

The data on the ecological parameters evaluated during the latest inventory period (1992-1996) show a great potential for natural regeneration and for species diversity. Factors that dampen optimal regeneration include game, grazing animals, silvicultural measures and external influences.

On many experimental plots, the regeneration of the dominant tree species is accompanied by the spontaneous reestablishment of rare, ecologically valuable species that promote the stability of the entire stand (i.e. maple, mountain ash, oak, lime tree, larch, fir).

- Small-scale and benign forest cropping

Only two-thirds of the timber growth is used annually (70% final felling, 30% produce from thinning). Austria's forests are managed on a small scale. This is due to the mosaic-like pattern of property ownership and the high proportion of small forest stands. Fifteen percent of final felling takes place in stands measuring 0.2 – 2 ha, 32% are small-scale removals, 53% involves felling individual trees. Clear-cutting of surfaces exceeding 500 m² has further dropped according to the latest inventory data. Clear-cutting of more than 2 ha is illegal in Austria, whereas felling areas larger than 0.5 ha requires approval by forestry authorities.

Based on the above-described status quo and legal framework, the following agenda has been compiled to meet the set objectives:

Measures

• promotion of ecologically oriented forest tree measures:

More ecologically oriented subsidy system; priority should be given to gradually achieving natural forest communities, especially deciduous and mixed forests:

- increased afforestation (deciduous forests, mixed forests and/or reforestation of valuable broad-leaved tree species in sparsely forested areas)
- increased silvicultural measures (regulation of mixed growth)
- no subsidies for spruce cultures in exclusion areas (determined based on areas of origin)
- increased subsidies for stand restructuring (particularly in those 7% of Austria's forests classified as artificial in the hemeroby study)
- integrated forest conservation with priority being given to biological and biotechnological measures, i.e. ant protection, bird boxes, woodpecker trees, decoy trees.

• Education and training, information campaigns and public relations efforts

Greater emphasis on ecological issues in education and training; information and public relations campaigns concentrating on: increased use of the natural rejuvenation potential, a multi-storied forest structure, small-scale use, use of environmentally compatible timber harvesting methods along with integrated forest conservation.

• Monitoring, indicators of sustainable forest management

- Further development of the Austrian Forest Inventory: incorporate additional features that enable insight into the inner structure of the forest (i.e. stand deficiencies, cultivation measures, site features, dead wood). The new survey period (beginning 1999) will permit not only forest policy aims but also ecological objectives to be evaluated on an ongoing basis. (Efforts are currently underway in the framework of a research project to determine which standard indicators provide information on biodiversity and which additional data need to be collected for uninterrupted monitoring and permanent evaluation.)
- Forest development plans as an important basis for forest policy decisions on the Federal and Provincial level: increase efforts to incorporate ecologically relevant elements, use the hemeroby maps as a new basis for decisions on a nationwide basis for amelioration measures and for potential subsidies.
- Participation at the international level in further developing criteria and indicators for sustainable forest management; implement the results at the national level.

• Research

Focus on research projects and commissions dealing with near-natural forest management; evaluate the information gained from the natural forest reserve network.

2.3 Hunting

Legislative and executive jurisdiction in hunting as a legal entity lies with the Provinces, leading to 9 different Provincial game laws. Hunting is inseparably linked with the private ownership of land and the system is therefore based on individual hunting grounds. A certain minimum acreage is required before hunting can be conducted (115 ha for owners to hunt on their own property). Game laws regulate hunting rights with regard to gamekeeping, killing, and procuring huntable species of wild animals; they also contain numerous provisions governing the preservation and use of these species. These regulations are based on the principle of sustainability and cover aspects of biodiversity.

The game laws in most Provinces are designed to ensure the preservation and use of healthy and species-rich populations of wild animals. In certain species, an objective evaluation of the sustainability of hunting is currently not possible because data on the regional status of these species and their population dynamics are lacking.

The habitat structure available to game species is strongly dependent on the type of agricultural or forest management practices as well as on the use of these habitats for human settlements, transportation networks, tourism, and recreation. Too little consideration is given to the interplay between these influences and the large-scale interactions that arise from the mobility of wildlife. Uneven hunting pressure can disturb the overall balance in the spectrum of game species, leading to a drop in biodiversity.

Traditional forms of game management, for example the emphasis on certain trophies, can lead to a one-sided change in population structure. Equally, non-selective forms of hunting can remove endangered species. Both approaches can potentially impact biodiversity. In the last few years, major progress has been made in putting new wildlife management insights into practice and in recognizing the ecological interactions between hunting pressure and biodiversity; continued efforts are required in some areas.

Several species that are on Austria's "Red List" of endangered species are subject to local hunting pressure. Such activities, coupled with other factors that lie outside the realm of game management (habitat loss), can compound the threat to these species. Objective principles for a sustainable exploitation of such wildlife need to be formulated to avoid a negative impact by hunting.

In some areas, conflicts between individual land-use interests (hunting, agriculture, forestry, nature conservation, tourism, recreation, transportation, general public interests) have already been defused through constructive cooperation; here, visible progress has been made in formulating and implementing solutions. Efforts to maintain the constructive climate necessary to solve remaining conflicts of interest should be continued and strengthened.

Several ongoing programs and activities already reflect the aims of the Convention in Biological Diversity. These are either funded by the Provincial hunting associations themselves or in cooperation with other institutions. The range of programs spans from establishing protected areas (buffer zones and refuges) to habitat improvement (creation of "ecostrips") to specific species protection programs (rock-goat, great bustard, peregrine falcon, bearded vulture, common otter, brown bear, lynx, etc.).

Goals

- Long-term protection of all populations of native wildlife and their habitats
- Game management practices that are adapted to and help improve the habitats

Measures

- Review game laws and other laws relevant to wildlife species and determine how these should be adapted and modified to comply with the aims of the Convention on Biological Diversity
- Preserve and restore the broadest range of wildlife habitats possible
- Combined effort by all interested parties to formulate conservation programs for species whose populations are threatened or decreasing (wood grouse, hazel grouse, partridge, brown hare)
- Establish criteria to evaluate the sustainable management of game populations and their habitats by hunting
- Intensify efforts to develop wildlife ecology plans that go beyond individual hunting grounds and integrate these in general land-use planning; incorporate biodiversity in regional planning
- Create transparent monitoring systems for game as a basis for wildlife ecology land-use plans and for shooting plans
- Expand and intensify common communication platforms of the key traditional land-use interests (hunting, forestry, agriculture) and other factors (tourism, recreation, transportation, development of human settlements, etc.)
- Inform the rural land-owners about the impact that their activities have on wildlife habitats
- Provide hunters with information on the ecological impacts of hunting
- Expand interdisciplinary education and training of all those persons involved in game management
- Improve the translation of new scientific knowledge on wildlife biology into action and improve communication channels between scientists and hunters

2.4 Fisheries

Over the past one hundred years, anthropogenic influences on aquatic systems (flood control measures, hydroelectric power stations, waste-water loads) have led to often massive negative impacts on the fish fauna. Water pollution as such has now been drastically reduced. Currently, a total of 74 fish species inhabit our native waters (including 2 lamprey species; white fish considered as a single species group). Of these, 15 are considered to be not autochthonous, i.e. they have been introduced or their populations can only be maintained by regular stocking. Five species (beluga, sternhausen, waxdick, glatt dick, semling) are extinct in Austria. The number of recent, autochthonous lamprey and fishes therefore totals 59 species or nearly 92% of the original native fauna. While the presence of most of the original species spectrum may be gratifying, the situation of many populations is dramatic: 43 species (72%) have already been entered into the "Red List" of endangered species. Ten species are under

the acute threat of extinction, 7 are highly endangered, 11 endangered, 6 potentially endangered, and 7 are known to be endangered, although their precise status remains to be defined; 2 species do not fit into this scheme.

2.4.1 Fisheries in Austria

Professional or commercial fisheries are virtually non-existent in Austria. Sporadic operations are carried out in individual lakes such as Neusiedler See, lakes in the Salzkammergut, and Bodensee. River fisheries have ceased altogether with the exception of the Danube in Upper Austria, where fishing provides added income at a few locations. These fisheries, which are negligible factor in the economy, operate with nets.

Rod-and-reel fishing, on the other hand, is a much more important factor in Austria. As opposed to commercial fisheries, whose catches largely reflect the species composition of the waters being fished, angling selectively removes target fish species. The number of anglers in Austria is estimated at ca. 200 000. Today, most of these anglers are organized in fishing clubs or are members of supraregional associations.

Angling has developed into a growth industry. Current estimates refer to an annual turnover approaching 1 billion ATS, broken down into leasing rights (300 million), stocking (100 million), fishing licenses (200 million) and equipment (400 million). This is accompanied by indirect profits from tourism, food and lodging, transportation, etc. that are difficult to estimate.

In 1996, the total take (landings) of fish from Austrian waters was 5222 t. According to statistics compiled by the "Institut für Gewässerökologie, Fischereibiologie und Seenkunde" (based on data provided by Provincial fishing associations as well as the Trout Farming Association and fish-pond associations), 705 t were taken by anglers, 450 t by commercial operations, 975 t from carp ponds, and 3092 t from trout farms (total: 5222 t).

These annual takes are balanced by massive stocking measures with commercially produced fish; in some cases more fish are stocked than caught. In the Province Salzburg, for example, rivers are stocked with 42 078 kg of fish, yet only 37 200 kg are reportedly taken. In 1996, 165 t of carp and 953 t of trout were bred for stocking purposes in Austria.

The need for stock fish is increasing. In 1994 a total of 1147 t were needed; 91% were produced domestically.

2.4.2 Impact of fishing on fish populations

The above statistics clearly show that fisheries exert a major impact on the fish populations of natural waters. This is compounded by so-called put-and-take fishing in certain waters, a practice in which stocking takes place immediately prior to fishing. This involves legal-sized fish, i.e. very large specimens that can disrupt natural

populations. Increasingly, the management of many fishing waters has begun to turn to more natural approaches; the goal is to exploit only the natural yield of a water body in order to conserve the resource and promote natural spawning.

In some cases, however, running waters have been damaged to such an extent by damming, hydropeaking and other power plant-related engineering measures that natural fish populations can no longer exist. Without stocking measures by fisheries, many river stretches would support virtually no fish today.

At the same time, artificial stocking gives rise to a series of problems, among them a reduced genetic heterogeneity of fish population, qualitative and quantitative fauna shifts, altered water chemistry due to overstocking, and introduction of fish diseases. On the other hand a sustainable fish stocking policy can contribute significantly to preserving fish populations (i.e. the re-introduction of various sturgeon species, native carp, etc.)

2.4.3 Legal framework

Under Art. 15, Section 1 B-VG, the legislative and executive jurisdiction in fisheries lies with the Provinces. Fishery laws are therefore passed by state parliaments and enforced by district authorities (in most Provinces) in first court-cases and by Provincial governments in second court-cases. In enforcing fishery laws, all Provincial governments are obliged to enact regulations to bring into force the laws in general and to enforce specific provisions in particular. Some fishery laws stipulate that agreement must be reached with the authorities of the neighboring Province in passing regulations governing water bodies that border two Provinces. Fisheries are classified as agricultural and forestry products in the sense of Section 2 Par. 3 of the Trading Regulations (1973) and therefore do not fall under the Trading Regulations. The following items are regulated in the individual fishery laws of the Provinces: fishery rights, fishing waters, fishing districts, leases, management regulations.

Goal

- Increasingly factor ecological principles into fisheries management and its legal foundations; the main goal is to preserve the natural species diversity and genetic variability of the fish fauna (e.g. through breeding programs for endangered species).

Measures

A variety of measures have already been carried out or initiated. Selected examples are listed below.

- Individual projects have been conducted to genetically preserve and reintroduce endangered native commercial fish species, for example the project of the "Institut für Gewässerökologie, Fischereibiologie und Seenkunde" to breed threatened species
- The development of a method to conserve the sperm of salmonids in liquid nitrogen (project of the "Institut für Gewässerökologie, Fischereibiologie und Seenkunde" together with the University of Salzburg). A similar project has been submitted for cyprinids
- Establishment of the necessary gene reserves

- The introduction of extensive-ecological methods (in the sense of organic farming) in carp ponds
- Ecological aspects have increasingly been taken into consideration in amendments to fishery laws, for example in Lower Austria, where live bait and fishing competitions have been prohibited and stocking guidelines established that are designed to promote conservation initiatives and appropriate stocking measures.
- The preparatory work for introducing a fishing test is far advanced; in Lower Austria and Styria they are already incorporated in pending draft amendments. The Austrian Fishing Association, in cooperation with the “Institut für Gewässerökologie, Fischereibiologie und Seenkunde” in Scharfling, has been conducting courses to qualify teachers for the fishing test.
- Cormorant management models have been negotiated or are currently being discussed in the most affected Provinces (Upper Austria, Lower Austria, Styria). In Lower Austria and Styria this was done in a constructive cooperation with bird protection and hunting groups. On the Federal level, a working group formulated recommendations for implementation on the European level. Management guidelines for running waters were discussed. A nationwide working group that examined the issue of flooded gravel mines and fishing will be shortly presenting its conclusions.
- Fish species mapping projects are in preparation or have already been initiated on a regional basis
- Stocking measures must take the genetic origin of the material into consideration
- Qualitative and quantitative survey of fish populations and the development of so-called “Leitbilder” (models reflecting the original, pristine status of a particular water body) along with measures that guarantee sustainable fisheries and an ecologically oriented management of fish waters. A key basis for an orderly, sustainable management is information on the current status of fish communities and their growth and reproduction parameters from both a qualitative and quantitative perspective. Additional crucial information is the potential natural species composition for the particular water body (specific “Leitbild”). Such population data at the fishing-district level would be the cornerstone of the fishery cadaster (not available to the public). As a minimum requirement, this cadaster should include all the items specified in the Vienna fishery cadaster.
- Compile statistics on stocking and takes. For each individual water body, the maximum number of fish stocked needs to be defined and stocking efforts should be restricted to specific species based on population surveys and the particular features of the aquatic system. Takes by fishermen (both anglers and commercial fishermen) are to be recorded in standardized catch statistics on a nationwide basis that, at minimum, should include catch site and time, fish species and fish length.
- Promote the establishment of conservation initiatives responsible for fishing districts that are combined based on common aquatic features. A conservation initiative is defined as a union of several districts for the purpose of uniform management. All measures such as stocking practices, catch regulations, licensing, closed seasons, and fishing techniques should be drafted into a management plan.
- Introduce a nationally standardized, “genuine” fishery test in all Provinces. Everyone who fishes, but especially those charged with tending to commercial operations, should have the necessary training. A fishery test - similar to the hunting test - should be mandatory before being issued an official fishing card or obtaining a fishing license.

- Modern fish breeding and production based on ecological perspectives and healthy fish populations, especially when fish are produced for stocking purposes
- Create uniform laws and organizational structures in all Provinces to draft, implement and control fishery matters.
- Fish predator management at the EU- and national/Provincial level in order to solve conflicts arising from fish predators (typically cormorants) through constructive cooperation between fisheries, nature conservation, hunting and responsible authorities
- Based on the wealth of tasks outlined above it appears desirable to send special fishery consultants with an ichthyological background to official government fishery bodies.
- As far as stocking efforts are concerned, autochthonous fish for the individual water body types should be produced in recognized fish farms specialized in high-quality fish.
- All Provincial laws should contain provisions to regulate fishing in nature reserves. Fisheries in precisely these areas should have a model character and be managed by trained experts, enabling the experience gained here to be transferred to other fishing districts.

Clearly, every water management measure designed to preserve and restore the ecological integrity of aquatic systems will serve to promote the diversity of the fish fauna. This includes improving water quality by installing sewerage systems, passive flood control, as well as promoting natural spawning by improving the structural diversity of the water body. Ongoing programs that monitor water chemistry and water quality within the framework of national and regional networks also contribute significantly to preserving species diversity.

3 Species conservation and species protection

3.1 Species conservation

3.1.1 Present situation

The conservation of endangered animal and plant species has a long and traditional basis in Austrian law. As far back as the 15th and 16th centuries, game and forestry regulations as well as fishing rights acts had provisions (restrictions and protective regulations for individual species) designed to protect the relevant resources. In the late 19th and early 20th century, nature conservation regulations were initially introduced to protect alpine flowers and animal species with cultural significance in the various Provinces. In recent times, this has been supplemented by more comprehensive habitat protection laws.

Biodiversity came under pressure from a variety of sources: rationalization and modernization in the agricultural sector, increasing land-use by tourism, rapidly expanding settlements and traffic networks (15 ha of grassland lost daily in the early 1990s). According to figures released in the various "Red Lists" and surveys conducted by the UBA, currently 48% of the native fern and flowering plants, 72% of the native fish species, 94% of the reptiles, nearly 100% of the amphibians, 56% of the birds, 52% of the mammals and one-third of our native species of large butterflies are endangered or threatened with extinction.

The loss of certain biotopes (i.e., semi-natural grassland formations, orchards, riverine forests, moors, scree landscapes), the increasing fragmentation of the landscape through human settlements and infrastructural facilities, the loss of dynamic processes in ecosystems, as well as the latent disruption of even remote landscapes (ski touring, canyoning, rafting, paragliding, etc.) and unabated pollution (indicated, among others, by the shrinking ranges of many lichen species) have led to ever more dramatic impacts and habitat loss. Crucial course adjustments have been initiated by measures such as establishing new nature reserves, contractual nature conservation, the NUP, and a re-alignment of agricultural policy.

The legislative and executive jurisdiction in the realm of species protection rests largely in the hands of the Provincial Governments; this sector primarily includes nature and landscape conservation along with hunting and fishing; as far as landscape preservation is concerned, regional planning as well as agriculture and forestry, tourism and recreation are also involved. Based on various national and international norms, numerous measures are currently being implemented to help preserve species diversity. Most of the provisions in the Bern Convention, for example, have already been fulfilled by Provincial animal- and species protection regulations as well as hunting restrictions.

In order to implement those EU guidelines relevant to nature conservation (Fauna-Flora-Habitat Guideline, 92/43/EWG and the Bird Protection Directive, 79/409/EWG), numerous areas covering a considerable part of the nation's territory have been

nominated for the network “Natura 2000”. On the other hand, most of this land involves already existing nature reserves. The 1996 study “Important Bird Areas in Austria” conducted by the UBA and BirdLife Austria lists 58 breeding bird areas and migratory stops with supraregional importance in the framework of the international Important Bird Areas Program. As far as fishery law is concerned, Austria has some catching up to do. The Provinces fulfil the CITES regulations in EU VO (EG) Nr. 338/97 of the Council and 937/97 of the Commission by passing the respective implementation regulations on international trade in endangered animal and plant species; this is based on the recently enacted Federal law on trade in species (BGBl.Nr. 33/98). The Provincial Government acts here as the “scientific authority”.

Habitat protection is a crucial element in the survival of native animals and plants as well as of migratory species. To this end, Austria is implementing international conventions (Bern Convention, Ramsar Convention, Convention on Biological Diversity). The efforts are primarily concentrated in the nature conservation and landscape protection sectors (establishment of nature reserves including national parks, nationwide biotope protection regulations), but also in the realm of game laws (closed areas for hunting, natural biotope and habitat protection areas) and fishing laws (protected spawning areas). Finally, ecological considerations are being factored into regional planning. Key measures here include subsidies and contractual nature conservation, approaches founded in civil law that also help guarantee the long-term preservation of areas outside of nature reserves. Cooperation with Austria’s water management, agriculture and forestry sectors is crucial in safeguarding the ecological basis for many species. Programs devoted to particular species are immediately effective in species protection (bat project, meadow breeder project).

Austria can boast the successful re-introduction or stabilization of populations of species that were once native to Austria but that have since become extinct or largely displaced. Examples include the brown bear (Environmental Ministry, NGOs and the provinces Lower Austria, Upper Austria, Carinthia and Styria), the bearded vulture (Environmental Ministry, NGOs, National Park Administration Salzburg), fish otter (NGOs), beaver (NGOs) and rock-goat (private initiatives, hunting associations of various Provinces). Thanks largely to rigorous protective measures, many species have recolonized formerly depopulated areas (e.g. common heron). Strategies aimed at the Bodensee forget-me-not (*Myotis rehsteineri*) also deserve mention here. On the other hand, habitats of many other species continue to be lost: grouse, white-backed woodpecker, corncrake, common roller, great bustard, day-birds of prey and night-birds of prey, bats, numerous species of wild plants, and the threatened loss of local domesticated animal breeds and cultivated plant varieties.

3.1.2 Goals

- Maintain self-supporting populations of all native animal and plant species
- Preserve the spectrum of species and varieties characteristic for the region
- Reduce or stop of further habitat fragmentation
- Reduce the environmental impact of human activities (in particular, avoid disturbing brooding sites, spawning waters, refuges)
- Preserve interconnected landscapes that enable natural populations of plants and animals to coexist with human activities

- Preserve remaining pristine landscape fragments as refuge habitats for endangered species
- Land-use that allows species to survive and, when management practices change, permits the organisms to react (for example to retreat to buffer zones or compensation areas)
- Create and maintain ecological corridors that enable genetic exchange between populations
- Improved coordination between international conservation efforts, particularly with respect to migratory animal species and habitats that straddle international borders
- Coordinate in-situ and ex-situ measures to protect endangered species

3.1.3 Measures

- Promote research and data collection tailored to species protection
- Improve the exchange of information between science, authorities, NGOs and political decision-makers
- Mandatory compensation for impaired habitats
- Accelerated implementation of (if necessary, transboundary) species protection projects for endangered species, for example in the framework of species protection programs
- Expand contractual nature conservation efforts for species protection measures in cooperation with the sectors agriculture, forestry, hunting and fishing
- Maintain and, if needed, improve current protection regulations and closed seasons; anchor species protection as an official mandate in Provincial nature conservation laws
- Create species protection maps for endangered species; coordinate these with biotope mapping efforts; improve existing protection regulations as needed
- Factor ecological principles into fishery laws, with special emphasis on species protection
- Tailor landscape conservation projects to accommodate integrative species protection
- Draft uniform guidelines for releasing animal and plant species
- Ongoing updates and regionally differentiated “Red Lists” of endangered animal and plant species (including cultivated plant varieties and domesticated animal breeds on a region-by-region basis)
- Develop comprehensive criteria to enable scientific evaluation and administrative decisions regarding the release of genetically altered organisms that could naturally interbreed or could potentially have a significant impact on near-natural ecosystems
- Improve the financial situation and increase the staffs of facilities and agencies involved in species protection
- Consider becoming a party to the Bonn Convention and its agreements

The right to ecologically functional landscapes that are intact on a regional level is viewed as a fundamental human right. It is the ethical responsibility of every citizen to help preserve this cultural and natural heritage, including the diversity of animals and plants.

3.2 Landscape protection

3.2.1 Present situation

Landscape is generally defined as a delimited section of the Earth's surface reflecting the sum of its component parts, manifestations and formative anthropogenic influences. In addition to a qualitative, scientific dimension, landscape also features important psychological and sociological elements. These arise through the aesthetic impression perceived by the onlooker, because landscape mirrors part of our value system and is a cornerstone of human existence (psychotope function). Today, the primeval landscapes of historic times, which were only minimally influenced by human activity, have been reduced to a few relict areas within Austria's borders due to thousands of years of human endeavor. Among others, these encompass highland moors, primeval forest fragments, and more extensive alpine landscape complexes including undisturbed glacier regions.

Man's more immediate environment is determined by the "cultural landscape", i.e. the landscape shaped and formed by human hands. A distinction can be made here between near-natural cultural landscapes (alpine meadows, forests that are being logged) and more heavily impacted areas such as intensively exploited farmlands, settlements and traffic surfaces. Austria's forest cover of 47% ranks it among the European countries with the most timberland. Farmland currently comprises ca. 30%, aquatic ecosystems 1.5%, human settlements and roads ca. 12%. The trend is clearly towards a concentration of development in urban centers, towards unchecked low-density settlements in the countryside, and towards ever-increasing accessibility fueled by commercial (tapping forest resources) or touristic (opening up ski resorts) interests. In the early 1990s, the amount of land built-up annually in Austria amounted to 33 km² per year. Well-known factors that negatively impact landscapes include: fragmentation through transportation infrastructure, indiscriminant low-density settlements, and agro-industrial exploitation.

The landscape tends to mirror the natural and cultural heritage of a region. It also enables identification with a particular area based on its unmistakable individuality. Protecting landscapes from destructive impacts is equally as important as the role of overall landscape planning in harmoniously incorporating necessary projects (road construction, etc.), whereby aesthetic and functional-ecological aspects are to be given equal weight.

Austria is blessed with a great number of different natural and cultural landscapes; this diversity is also a measure for Austria's high ranking as a vacation site. The structural diversity of the remaining primeval landscapes and their remnants is clearly correlated with a high potential for biodiversity; at the same time, the role of various cultural landscape types, particularly those that are near-natural, in preserving biodiversity is no less important. This is especially true for landscapes that have traditionally been exploited extensively, such as hedgerows, orchards, woodlands (e.g. with larch), semi-natural grassland formations, litter meadows and other wetland complexes. The latter in

particular need active, proper care such as that provided by traditional farming methods. Another important factor for preserving traditional cultural landscapes is the subsidy system in agriculture and forestry as well as in the nature conservation sector. The preservation and upkeep of historical arboretums, gardens and parks along with their unique architectural features also represents a major responsibility.

On one hand, protecting and preserving landscapes maintains the greatest possible landscape diversity and thus helps guarantee high biodiversity. On the other hand, it helps to keep Austria an attractive tourist destination and promotes the well-being of the country's citizens. The sensory modalities of a small brook, a bizarre rock formation or a river landscape with its soft, undulating lines contribute significantly to the recreational experience; in fact, such physiological and ecological interactions are vital in the development of the individual and in establishing individuality in general. The daily experience with the landscapes in our immediate environment creates a positive incentive to experience nature and therefore directly promotes our acceptance of the biodiversity concept. The impression a landscape makes is determined by its contents, i.e. its structural elements. Beyond preserving existing landscapes, we can also maximize the quality of our interaction with nature by restoring damaged or destroyed landscapes.

In Austria, landscape protection is anchored primarily in the nature conservation and landscape protection laws at the Provincial level; land parceling laws and alpine protection laws are also relevant. These laws consider the optical (aesthetic) image of the landscape and, in most cases, its ecological valuation (landscape balance). The decisive factors for landscape planning, however, are aspects of land-use planning, agriculture and forestry, tourism, recreation, as well as consumptive uses of land by industry (e.g. gravel mining).

3.2.2 Goals

- Recognize land as a “finite good”
- Avoid further impacts on the natural and cultural character of landscapes. Preserve the beauty and identity of the landscape
- Replace consumptive landscape use with sustainable, environmentally compatible landscape uses
- Reduce foreign landscape elements, disruptive technical structures and measures
- Work toward site-related forest stands
- Preserve naturally evolved small-scale structures and introduce structures into those landscapes that have been denuded on a large scale
- Preserve and promote ecologically relevant landscape structures such as aquatic microhabitats, hedgerows, field shrubs, alleys and old orchards, particularly in agriculturally exploited areas
- Preserve and impound sufficient water reserves; protect wetlands
- preserve sufficient ecotones and create or preserve buffer zones between highly divergent landscape types (e.g. transitional zone between industrial areas and lake shores)
- improve coordination between general land-use planning and specific technical planning (e.g. forest land planning, nature conservation planning, water management)

planning, traffic planning) as well as promote synergistic interactions to protect the landscape

- Secure the traditional structure of the cultural landscape by preserving old architecture along with the surroundings necessary for the structures to develop their full effect

3.2.3 Measures

- Control land-use through coordinated agendas (land-use planning, subsidy system for residential construction, zoning laws, land policy)
- Concentrate construction in existing building land
- Use abandoned industrial and commerce sites before dedicating new land for this purpose
- Integrate landscape planning as an instrument in all relevant sectors such as land consolidation, hydraulic engineering, traffic infrastructure, industrial facilities, etc.
- Take measures that make small-scale management an attractive alternative or that preserve such management (agrarian policy, contractual nature conservation)
- Promote and provide advice advocating forest management practices that support the respective natural forest communities
- Protect pristine landscapes (e.g., moor complexes, glaciers, natural forest reserves)
- Create or, when present, preserve the biotope network in exploited (for example large-scale agrarian) areas, including shaping the outskirts of towns and cities
- Heed the integrity of poorly structured habitats (steppes) when implementing erosion prevention measures; incorporate the provisions of the Ramsar Convention
- Compile a national wetlands strategy
- Revitalize impacted wetlands
- Manage wetlands in the sense of the Ramsar Convention
- Create opportunities for animals to cross all structures that transect habitats or cut off the natural migratory paths ("green bridges", toad tunnels, fish ladders)
- Limit to an absolute minimum those measures that compact and seal the soil
- Deregulate channeled running waters ("river restoration")
- Give adequate consideration to functional and aesthetic interactions between adjoining habitats (forest, forest edge, meadow)
- Intensify research into natural and cultural landscapes and put the results into practice
- Consider landscape protection in exploiting geogenic raw materials
- Minimize the impact of energy lines, transmitter masts and windmills to the landscape

4 Research and Monitoring

4.1 Recording biological diversity

The systematic recording of biodiversity has a long tradition in Europe. The introduction of the system of scientific taxonomy by Carl v. Linné (1735) gave rise to a wealth of regional monographs. National surveys of biodiversity that compile information on the existence, distribution, status, abundance and range of species and habitats were only initiated in the most recent past.

In Austria, complete overviews exist for the following groups: In the species diversity sector, works have been compiled on ferns and flowering plants (Niklfeld 1973, Adler et al. 1994), the mosses (Grims 1985), lichens (Türk & Wittmann 1986), mammals (Spitzenberger 1978-1997), the avifauna (Dvorak et al. 1993), the amphibians and reptiles (Cabela & Tiedemann 1985), fishes (Spindler 1995), as well as selected invertebrate groups. As far as cultivated plants are concerned, an overview of the collections of the different varieties in gene banks (Index Seminum Austriae) exists. On the habitat level, overviews have been published on moors (Steiner 1992), backwaters (Gepp 1985, Lazowski 1996), still waters (Dvorak et al. 1994), semi-natural grassland formations (Holzner 1986, Paar et al. 1994), forests (Mayer 1976, Grabherr et al. 1997) and plant communities (Mucina, Grabherr, Ellmauer & Wallnöfer 1993). Comprehensive overviews of plant communities, their habitats and habitat-induced variations should incorporate the subsoil plant organs. The significance of root ecology has therefore been a focal point of research in Austria (Kutschera et al. 1983, 1991), in close cooperation with the international working group.

In Austria, the Provincial museums and the Natural History Museum in Vienna can boast a particularly long tradition in inventorization. Based on these data, "Red Lists" of endangered species have been compiled for several groups of native wildlife and plants on a Provincial and nationwide scale (Niklfeld 1986, 1998 in press; Gepp 1983, 1996).

Research policy and grants are largely regulated in Austria by the "Forschungsorganisationsgesetz" as well as by the "Forschungsförderungsgesetz" and the "Innovations- und Technologiefondgesetz". The Austrian Joint Research Program "cultural landscape", which is a 10-year interdisciplinary research program, is currently developing guidelines for a sustainable development of our cultural landscapes. The EU's 4th Scientific Framework Program for Research and Technical Development is designed to promote those studies in the field of "environment and climate" that examine environmental changes due to human activities (catchword: "global change") and their impacts on natural resources (water, forests, agriculture, etc.). One topic here is "biological diversity and environmental changes". It would be important for the 5th Scientific Framework Program to identify biodiversity as a focus of research.

Goals (legal/institutional)

- Guidelines governing scientific research must give adequate consideration to the issue of preserving biodiversity

- The coordinated surveys of biodiversity in Austria must be centrally collected and interlinked
- Special research facilities should be entrusted to deal with issues of nature conservation and the sustainable use of biodiversity

Measures

- Anchor the preservation of biodiversity as a research goal in relevant laws and stipulate that research on nature conservation and environmental protection merits funding
- Establish an umbrella organization to coordinate and interlink the Austrian biodiversity databanks and promote inventorization initiatives (found an umbrella organization, for example a Federal-Provincial accord based on Art. 15a B-VG)
- Create a nationwide research initiative for biodiversity

Goals (programs/foundations)

- Close glaring gaps in basic research (incomplete inventories of biodiversity elements, minimum sizes of protected areas, minimum population sizes required for long-term survival)
- Provide scientific prognoses on trends in biodiversity under a range of scenarios and on the consequences of new technologies
- Compile a scientific basis for evaluating the role of biodiversity in the sustainable use of natural resources, i.e. in ecosystem stability and dynamics

Measures

- Formulate a program for a coordinated, efficient and comprehensive study of biodiversity, its preservation and sustainable use; define critical parameters and effects on biodiversity
- Coordinate all existing biodiversity databanks according to international standards
- Determine the impact of all non-native, free-living species on autochthonous species and ecosystems
- Conduct studies on the germination behavior, storage conditions and replacement cycles for all species, varieties and breeds held in gene banks
- Develop models to predict biodiversity trends under expected conditions and changes
- Study the individual elements of biodiversity (habitats, species and their genetic variability), their existence, distribution and status
- Conduct ecosystem-level studies to characterize and quantify the importance of various components of biodiversity (e.g. symbioses between particular organisms, structural elements) for ecosystem dynamics

Goal (financial)

- Provide sufficient funds for biodiversity-related research

Measures

- Research funding agencies must allocate sufficient funds to study biodiversity

4.2 Monitoring changes in biodiversity

According to a recent study by the UBA, ca. 100 vegetation monitoring projects are currently being conducted in Austria. They are investigating a total of 16 757 quadrats with an overall surface areas of 458 ha. These projects deal with change and development in habitats or populations of species, including aspects of their use.

The oldest still existing quadrats in Austria, designed to deal with nature conservation issues, are located in the Perchtoldsdorfer Heide near Vienna and have been monitored for 50 years. The most intensive observations are being conducted in forests: 83% of all quadrats are located here. Moors and alpine habitats are among the more neglected ecosystems under study by the quadrat method.

Most monitoring projects devoted to biological diversity are rather restricted geographically. On a Province- or nationwide level, only few projects are designed to deal with entire ecosystems or provide information on the status and trends in protected areas within a Province. Examples include: Burgenland, where management measures to preserve nature reserves are being evaluated; the current version of the Austrian Forest Survey (includes dead wood), which monitors forest condition over a nationwide grid system and is integrated into a European network; the Soil Status Survey, which not only investigates the condition of agriculturally exploited soils but also monitors their soil microbiology. The integrated monitoring in the National Park Kalkalpen is part of an international UN/ECE program. Research projects using the quadrat method have been established in virtually all of Austria's National Parks, whereby the National Park Neusiedler See - Seewinkel is being studied the most intensively. A long-term monitoring concept has been drafted for the National Park Hohe Tauern.

Most of the monitoring projects in the field of zoology deal with ornithology, e.g. monitoring white stork, corncake or jackdaw populations. The populations of water birds are also under permanent observation throughout Austria. Certain animal species, particularly those that have been re-introduced or are being stocked, are more closely monitored.

The legal basis for regularly monitoring biodiversity is currently inadequately anchored in the nature conservation laws of the Provinces (only Burgenland has such provisions, albeit only insofar as sufficient funds are available). The Fauna-Flora-Habitat Guideline commits member states to regularly provide reports on the condition of habitats listed in Appendix I and the species listed in Appendix II.

Goals (legal/institutional)

- Legal regulations on monitoring biodiversity
- A national program to monitor biodiversity
- Centrally coordinated surveys and records of Austria's biodiversity

Measures

- The national Biodiversity Commission should define which species etc. are to be evaluated based on the regular reports that the Convention on Biological Diversity requests be submitted

- Enact regulations on regularly monitoring biodiversity in the nature conservation laws of the Provinces
- Expand current facilities or create new institutions to study and record biodiversity

Goal (basic approach/programs)

- Record the status quo of biodiversity and counteract negative trends

Measures

- Compile an internationally compatible program to monitor biodiversity nationwide
- International cooperation to formulate harmonized indicator systems to evaluate biodiversity
- Organize a standardized monitoring network in Austria's protected areas to determine the so-called favored preservation status

5 Tourism and recreation, mining, industry, energy

5.1 Tourism and recreation

Present situation

Tourism is a powerful branch of the economy worldwide and is an important source of income for Austria as well. Without making tourism a sustainable enterprise, key objectives of global and national environmental policy such as preserving biodiversity, averting climate change, or reducing the consumption of resources could never be achieved. At the same time, tourism is highly dependent on healthy, intact environments.

Sustainable development means achieving a balance between improving economic and social conditions and securing the natural cornerstone of our existence over the long term. Many trends in the tourism trade run counter to this agenda and face both national and international environmental policy with major challenges.

On one hand, studies have registered a heightened ecological awareness in tourists as well as an increased desire to experience pristine nature and intact environmental conditions while vacationing. On the other hand, the trend toward travelling “more, longer and farther” is also on the increase. Global travel is growing at an average of 4% per year. This is accompanied by an undiminished diversification of recreational and leisure activities through technical innovations as well as the development of ever new sporting goods and improved equipment. Together, these factors have expanded our travelling customs and leisure activities, both spatially and temporally, and have also increasingly encroached on unspoiled nature. Additional negative impacts include the unchecked construction and urbanization of attractive natural and cultural landscapes, along with the overexploitation of natural resources in tourist Meccas and ecologically sensitive areas.

In its role as an aspect of sustainable regional development, integrative tourism can support the goals of nature conservation and environmental protection and can contribute to preserving cultural landscapes and to financing protected areas.

Legal framework

Tourism is an integrated entity both from the administrative (regional planning, commercial law) and factual perspective (nature conservation, transportation). The funding policies and funding guidelines of the federal ministries, however, play a key role in influencing the direction in which tourism develops. The National Environmental Plan represents a collection of important instruments and measures; these must be implemented if tourism is to be oriented toward environmentally and socially compatible goals.

Legal measures designed to protect biodiversity must be set in the sectors regional planning, commercial law, nature conservation and traffic and transportation. The UVP (Environmental Impact Assessment) law deserves special mention here. It plays an important role in certain tourism projects such as opening new or expanding existing ski regions larger than 20 ha; environmental impact assessments are also required for the

construction of hotels (more than 1000 beds or a surface area of more than 10 ha) outside of zoned urban systems.

Goals

Tourism functions within a certain socio-political framework and is therefore defined as an integrated sector that must seamlessly fit into an overall concept of a sustainable economic and social system. The key to a high-quality, future-oriented tourism sector lies in a holistic view of the tourism program, in clearly defined political goals, and creating awareness in vacationers:

- Preserve intact natural habitats and landscapes as a prerequisite for tourism of the future (the ecological dimension)
- Embed tourism in a transsectoral, interlinked economy tailored to the region (the economic dimension)
- Factor in the self-determined cultural dynamics and social peace of the vacation site (the sociocultural dimension)
- Develop and apply management systems for intensively utilized tourist destinations
- Recognize the responsibility of the tourist's home-country for helping preserve the biodiversity of vacation destinations

Measures and instruments

The necessary measures on the Federal level are very comprehensive due to the complexity of the issues involved. Only a few examples can be outlined here.

- Nature and landscape protection:
 - Austria-wide strategy to enforce visitor-handling measures that help safeguard sensitive habitats and endangered species of animals
 - New areas are to be opened up only after environmental impact assessments that consider the carrying capacity of the region and demonstrate no danger to biodiversity
 - The Federal Ministry of the Environment, in cooperation with local communities and districts, is currently conducting several pilot projects on strategic environmental impact assessments in the land-use planning sector (regional development concepts, zoning)
- Education and research:
 - Integrate the topic “sustainable development” in all tourism-related training and education programs
 - Improve our knowledge about indicators of sustainability and use this to develop criteria for the maximum acceptable stress for endangered landscape types
 - Intensify research on the ecological and sociocultural impacts of tourism
 - Ongoing improvement of the “state-of-the-art” in the ecology of industrial operations and dissemination of best-practice models
 - Inform and create awareness in consumers about the impact of their leisure and vacation activities
- Cooperation between all parties involved:

- Expand and intensify marketing efforts for the Austrian environmental label for tourism enterprises
- Greater investment and more innovation in public transportation systems

- Subsidy policies:
 - Draft and implement holistic development concepts and models on the regional and national level
 - Gear all subsidy guidelines toward sustainable development
 - Evaluate all subsidies as to their adherence to the criteria of sustainable development

- Influence on international policies relevant to the tourism sector:
 - Maintain efforts to introduce a tax on kerosene
 - Spread holiday traffic out more evenly through internationally coordinated vacation times
 - Gear the European Structure Funds toward sustainable development

5.2 Mining

5.2.1 Present situation/legal framework

Mining is affected largely by those regulations in the Biodiversity Convention that pertain to in-situ preservation, as workable mineral deposits may coincide with the natural habitats of rare or endangered species. At the same time, mining operations can create secondary habitats that provide a home for various rare or endangered species.

The Berggesetz (Mining Act) 1975, BGBl.Nr. 259 regulates the mining of certain mineral deposits. Mining is also subject to the nature conservation regulations of the Provinces, including the forestry laws and water rights laws. Based on the allocation of jurisdictions between Federal and Provincial governments, implementing the Biodiversity Convention with regard to in-situ preservation in Austria – insofar as any adjustment is necessary considering the comprehensive set of relevant national regulations – is primarily a matter of the Provinces (who have jurisdiction in nature conservation issues).

5.2.2 Goals, measures and instruments

The site-specificity and type of mineral deposits determine the location of mining facilities. This site-specificity gives rise to a range of questions concerning the property situation, land owner rights, adjoining owners, along with conflicts between the interests of mining operators and other public interests such as landscape and nature conservation. A particular area of concern is the environmental impact and heavy traffic volume associated with transporting mineral deposits.

As opposed to many other branches of industry, conflicts in this sector cannot be solved by moving the industrial site (which in this case would mean abandoning the deposits).

Workable mineral deposits represent anomalies in the Earth's crust and are generally rare phenomena. Abandoning them can have wide-ranging economical consequences: these raw materials must then be imported: demand will not sink merely because national deposits are declared off limits to exploitation.

The intention of the draft amendment to the Mining Act 1998 is to factor ecological considerations into Austrian mining law, i.e. to incorporate issues of nature conservation and landscape preservation. In the future, approval to exploit mineral deposits will only be granted after weighing all public interests, including those of nature conservation and land-use planning. Those regional land-use planning regulations of the Provinces that are relevant to mineral deposits are to be made binding.

5.3 Industry

5.3.1 Present situation/legal framework

Industry is the most important economic sector in Austria, contributing 28% to the gross national product. At the same time, industry also contributes to protecting the environment and preserving biological diversity. Austrian business enterprises invest ca. 24 billion ATS annually in environmental protection. In the past few years, expenditures for environmental protection measures increased by a factor of five; the total sum for the period 1992-2000 will amount to ca. 172 billion ATS. Nearly half of this amount (44%) is earmarked for measures designed to reduce air pollution; 30.8% is invested in water quality measures, with the waste disposal sector (16%) growing rapidly.

A government inspection scheme helps guarantee that industry equips its facilities with state-of-the-art technology and meets the strict emission levels stipulated in legal regulations. The enterprises themselves contribute to the process by their voluntary participation in the cooperative eco-management and audit scheme (so-called EMAS system). Based on its EMAS-inspected sites, Austria ranks far above the EU average.

Protecting biodiversity from major construction projects (i.e., industrial complexes, railroads, road building, ski resorts) is largely guaranteed by the focused approval process of the Environmental Impact Assessment Law, BGBl.Nr. 697/1993 (UVP-G). It stipulates that both direct and indirect impacts – including potential interactions – of a project on the environment be analyzed in advance. Negative impacts are to be avoided or at least minimized. The term “environment” is defined to encompass not only the traditional environmental compartments (humans, soil, water, air, landscape, cultural and material goods), but also animals and plants along with their habitats (biotopes and ecosystems) as well as the climate. The public is party to this process.

The UVP-G is currently under revision, i.e. it is being adapted to the new EU legal guidelines and procedurally streamlined. Under trade law, those businesses and industrial facilities not listed in the appendices of the UVP guidelines also subject to approval, specifically if the life or health of neighbors and customers (§ 74 GewO) is endangered or when neighbors are potentially threatened by odors, noise, smoke, dust,

vibrations and other impacts, or if a negative impact on aquatic ecosystems is suspected.

The IPPC guidelines of the EU¹ introduce a mandatory, integrated licensing system. Based on best available technology for certain categories of industrial facilities, it is designed to prevent the shift of pollution from one environmental compartment to another and to guarantee a high level of environmental protection.

Based on the current legal position, all IPPC facilities in Austria now require licensing according to the respective material laws. Nonetheless, certain adaptations of the legal framework remain necessary. These include regular reviews and updates (at ca. 10-year intervals) of the licensing guidelines by the responsible agencies. This will ensure that facilities remain up-to-date and that the environment (and therefore indirectly biodiversity) is better protected.

5.3.2 Goals, measures and instruments

In licensing specific facilities, the responsible Federal ministries and ministers are called upon to consider the state-of-the-art technology in order to avoid negative impacts on health and the environment, including the preservation of biodiversity.

According to the Abfallwirtschaftsgesetz (Waste Disposal Act), facilities that process a certain volume of waste require approval by the head of the Provincial government prior to being commissioned. In the framework of this focused procedure, all aspects related to trade, water, forestry and mining laws are to be considered as they apply to preserving biodiversity.

Finally, consideration must be given to the relevant aims outlined in the NUP.

5.4 Energy

5.4.1 Present situation/legal framework

Austria's energy policy has potential negative repercussions on the diversity of species and landscapes, specifically through the emissions (pollutants, waste heat) associated with energy consumption and through the attendant construction activities. The entire spectrum of energy-saving and emission-reducing measures presented in the Energy Report of 1993 and in the updated 1996 Energy Report therefore contribute to protecting biodiversity.

Austria's nuclear energy policy is largely determined by the recognition that nuclear power is a symbol for risky and potentially extremely costly technologies that are

¹ Guidelines of the EU Council on Integrated Pollution Prevention and Control, ABl. of the EU Nr. L 257 of 10 October 1996, p. 26 ff.

incompatible with the principles and priorities of sustainable, long-term development. The nuclear energy policy in Austria has also come to the conclusion that nuclear power is not an inexpensive, viable option to combat the anthropogenic greenhouse effect.

5.4.2 Goals, measures and instruments

Measures that increase energy efficiency and the proportion of renewable energy sources are equally as important as those that help develop and improve efficient, environmentally sound technologies (particularly photovoltaic approaches).

A crucial instrument in implementing a nationally approved energy policy is the accords reached between the Federal government and the Provinces under Art. 15a B-VG. The energy-savings accord of 1995 (Energiesparvereinbarung, BGBl.Nr. 388/1995), which pursues and systematically implements a wide range of energy policy and environmental goals, deserves special mention here. Key passages are excerpted below:

- Establish the fundamental principle of harmonized Provincial regulations to attain the goals of this accord
- Give increased consideration to environment policy goals
- Tighten the minimum requirements for construction material (k values) for buildings
- Provide opportunities to apply energy-saving measures other than insulation to achieve established energy standards. Proof for the equivalence of these measures must be expressed in energy indices
- Approval procedures for individual products or type approvals: references based on a separate agreement between the Provinces
- Introduce mandatory efficiency standards for home furnaces
- Government subsidies for home-building and home-renovation tailored to implement the accord
- Label and describe the specific energy consumption of household appliances
- Mandatory information on the energy consumption values of comparable household appliances
- Set energy consumption limits for household appliances
- Coordinate subsidies to fully exploit the energy-saving potential in trade and industry

Austria's energy supply is based on a balanced mix of energy sources and is characterized by a heavy reliance on renewable fuels (hydropower). Important strategies include concentrating power lines and reducing landscape damage by applying less intrusive engineering measures.

Although the contribution of biomass to energy consumption has been steadily increasing over the past few years, its full potential is far from being exploited. Due to the advantages of using renewable energy sources, concerted efforts will continue to promote their market acceptability.

Finally, attention should be drawn to Austria's participation in the respective EU programs SAVE, ALTENER and JOULE/THERMIE, which play a positive role in preserving biodiversity.

6 Transportation

Austria's geographic location means the double burden of "home-made" traffic and international transit. Austrian environmental and transportation policies therefore face the daunting task of handling exploding traffic volumes, the integration of the former Eastern Bloc countries, liberalization tendencies, and increasing mileages in private and commercial traffic (especially through sensitive landscapes). On one hand, the country must solve its own transportation problems in an environmentally sound manner. On the other hand, a massive international effort must be made to set the agenda for a more environmentally compatible development of traffic in Europe.

Traffic negatively impacts biodiversity by fragmenting habitats and by requiring an extensive infrastructure; traffic-related emissions, such as air-polluting materials, also play an important role.

Although much has been done in the technological sector to reduce the specific emissions of individual vehicles, (improved mileage, NO_x reduction using catalytic converters, etc.) these advances require a long time to take hold due to the time-frames necessary to replace entire vehicle fleets. This progress is being countered by increasing motor vehicle registrations and the trend to more powerful, faster and heavier automobiles. Finally, the rapidly increasing traffic volumes due to growing transportation demand and transportation distances also tends to counteract progress in other sectors.

Goals - A model for environmentally sound mobility

Based on its relevance to the environment, the transportation sector must make a major contribution to attaining environment policy goals related to biodiversity, climate, etc.

The following principles designed to achieve sustainable mobility are anchored in the environmental agendas and implementation strategies of Austria's transportation and environmental programs:

- Minimize ecological and health risks
- Minimize potential threats and the risk of accidents
- Reduce transportation
- Improve and optimize transportation
- Shift to more environmentally compatible forms of transportation
- Increase energy efficiency and protect resources by promoting the use of new transportation technologies
- Establish "full costs" by internalizing former external costs based on the "polluter-pays" principle
- Promote economic efficiency to attain the optimal economic benefit with the least impact on biological diversity
- Provide balanced mobility opportunities: everyone, including previously disadvantaged groups like children, youth, women, the elderly, the handicapped, who

do not own their own vehicles, should be able to reach the workplace, centers of learning, cultural and infrastructural facilities, etc.

- Introduce technical measures to prevent, as far as possible, the fragmentation of habitats and the resulting segregation of species

Measures

Achieving the outlined objectives will require an agenda encompassing technical, planning, legal and economic measures, yet will also have to approach the problem from the viewpoint of transportation demand. Important instruments include:

- At the planning stage, greater consideration must be given to the effect of technical measures in the transportation sector, especially of measures that severely fragment habitats (infrastructure improvement, roads, railroad tracks, waterways, new airport runways, etc.).
- Environmental impact assessments for all branches of the transportation sector (road, rail, aviation); strategic UVP: Danube corridor
- Incorporate ecological criteria in the Federal transportation agenda
- Highway engineering guidelines for amphibian-friendly facilities
- Research and development in the field of environmentally compatible models
- Reduce transportation needs through regional and urban planning schemes that combat urban sprawl and through more balanced zoning measures that enable shorter daily commutes.
- Continue to promote the "Umweltverbund" ("environmental alliance" of public transportation, cycling, walking) as an environmentally compatible mode of transportation that helps save resources in the passenger sector. This calls for more attractive concepts and better customer service (e.g. installing a schedule and information system encompassing all public transportation systems in Austria). It also calls for "on-demand" transportation (taxis and busses that are on call), infrastructural improvements (public transportation in urban centers), as well as rapid realization of a system of cycle ways.
- Continued efforts to shift freight to environmentally more sound modes of transportation such as by rail or waterway (improve and modernize infrastructure, promote combined rail/waterway traffic, optimize logistics, etc.)
- Variabilize and internalize external costs: Economic instruments are to be applied to internalize formerly external costs according to the polluter-pays principle. Beyond this, price structures must reflect the scarcity of the respective resources (e.g. energy, space for roads). The most suitable approaches would be: a step-wise reorganization of transportation-related taxes and tariffs according to environmental criteria (i.e. to reflect true costs); road-use fees (tolls, road pricing); commercial parking; review the environmental compatibility of all transportation-related demands.
- Promote benign mobility: Those means of transportation with lower emissions and energy consumption, such as public transportation and cycling, are to be prioritized. The range of services must be extended and made more customer friendly in order to promote a shift to the more environmentally sound transportation systems. A more environmentally aware use of automobiles should be promoted through traffic calming measures, car sharing, as well as residential and tourism projects that ban cars.
- Technology and innovation: further improvement of technical standards by further reducing emissions for motor vehicles in the EU by the year 2000, by incorporating

hitherto neglected pollutant classes and vehicle types, and by improving fuel quality. Support the development of new technologies and innovations that would further reduce emissions in motor vehicles.

- Legal and technical measures to reduce speed limits for motor vehicles and measures to reduce noise and increase safety in all modes of transportation
- Public relations and building awareness: help promote environmental awareness and inform the general public about environmentally sound modes of transportation and appropriate driving behavior.
- Promote model systems that provide impulses for introducing innovative and inspirational concepts for sustainable transportation systems. Examples include the model initiatives “car-free tourism”, “mobility management for businesses”, as well as “mega-events – environmentally compatible and without traffic jams”. It also includes the more technologically oriented umbrella projects “noise-reduced railways”, “noise-reduced roads”, and information technology in the transportation sector, especially public transportation. Concrete steps toward implementation have also been taken within the framework of the graduated plan to reduce traffic emissions.
- Local Agenda 21: Greater emphasis must be placed on sustainable development at the regional level and in integrating all segments of the population. In order to meet this objective, the “Aalborg Charta” was adopted in 1994 by the First European Conference on Progressive Cities and Municipalities. Sustainable energy use and environmentally sound transportation were among the key topics of discussion. For this reason, the “Umweltberatung” (“environmental counseling agency”) has been commissioned by the Ministry of the Environment to conduct a campaign entitled “progressive cities and municipalities”. The “Klimabündnis” (Climate Alliance), “Städtebund” (Council of Cities), and “Netzwerk gesunde Städte Österreichs” (Network of Health-conscious Cities in Austria) are co-sponsoring this campaign.

7 Development Cooperation

The sector Development Cooperation (EZA) in Austria views the preservation of biodiversity as an integral part of its agenda. At the same time, this objective must be seen in the light of the traditional goals of EZA such as fighting poverty, promoting democracy and creating a suitable environment for sustainable economic development. Based on the experience gained by EZA, protecting biodiversity is less a technical or scientific problem than a social one: it is intimately linked with the functioning of subsistence, with land rights, and with human rights (particularly of the local population and very often of women). This explains why the successful special program “Nationalinitiative Wald – 3. Welt” (National Initiative Forest - 3rd World) strategically pursued these principles.

“Preserving and promoting the natural habitat” is one of the fundamental objectives expressed in Austrian EZA. Nonetheless, even after ratification of the Convention on Biological Diversity, this goal will not be pursued by introducing a wealth of new sectoral programs. Rather, Austria will continue down the successful route taken to date. EZA has, in fact, for some time been carrying out key measures and individual projects that provide an excellent basis for complying with the Biodiversity Convention. In the agricultural sector, for example, funding is provided exclusively for biological farming. The projects include biological pest control, benign use, alternative energy production and hydroelectric power, waste water treatment, low-emission production technologies in the retail business, appropriate forestry practices, the preservation of the traditional uses of medicinal herbs, and efforts to conserve these biological resources themselves.

The main goal, in agreement with the Biodiversity Convention, is therefore to maintain and consolidate the thematic issues; in the future, these are to be concentrated even more on the focal countries of EZA. Introducing a range of new sectoral programs would hurt rather than help the potential overall performance of EZA in preserving the biodiversity of focal countries. Additional Federal funding is not forthcoming. Any further reduction of regular funds for the traditional tasks of EZA would do more than merely thwart efforts to concentrate on at least some substantial development schemes; it would also pull funds from the numerous, successful independent projects that address the goals of the Biodiversity Convention.

To date, there has been only a single “globally spread” special sectoral program on biodiversity after undersigning the Convention on Biological Diversity, namely the “National Initiative Forest – 3rd world”. Most items in the program have already been concluded. Certain independent projects of great strategic importance continue to be funded. Whenever co-financing has been arranged, such projects can be extended. This program encompasses more 30 individual projects and, thanks largely to its support of indigenous habitats, has provided practical protection for the high biodiversity of a huge area (up to 4 times the surface area of Austria).

In the future, at least one independent sectoral program will be initiated for the focal countries. Its goal is to help inject the spirit of the Biodiversity Convention into the general policy and agenda of Austrian EZA. Thus, a separate sectoral policy will be formulated in the framework of rural development: its task will be to guarantee food

security under the perspective of preserving biodiversity. More precisely, this program is designed to preserve the wide range of germinable varieties of local and regional cultivated plants. This effort must be seen in the light of maintaining and preserving a functioning subsistence economy in rural areas as a basis for satisfying the most elementary human needs and as a nucleus for further economic development. It will address the question whether these varieties are, in fact, optimally adapted to the climatic and biological rigors under subsistence farming conditions. This will help ensure the survival of those subsistence farmers living under the most difficult climatic conditions.

Specific measures

- Support the relevant NGO activities and NGO networks
- Promote gene banks for seed stocks
- Collect the necessary data and conduct the necessary analyses
- Reactivate traditional knowledge about local south/south activities and disseminate information between tribal women
- A separate branch in the sector education and training should be entrusted with improving capacities; this should be done through education facilities and designed to ensure a subsequent, autonomous south/south training program at the postgraduate level.
- Plans are underway to introduce a large-scale incentive program for local activities that preserve the diversity of cultivated plants – analogous to the tree planting activities of the Green Belt Movement (Kenya). The operative component of this program, which will be carried out under the auspices of the agriculture sector, is strongly oriented toward women. This aspect can also learn from the Green Belt Movement. This planned subprogram (sector “agricultural development”) to preserve the biodiversity of traditional varieties of cultivated plants was stimulated by the Convention on Biological Diversity.

The current budget situation prohibits medium- and long-range funding plans for more extensive efforts involving a range of directed sectoral programs. Nonetheless, projects that tackle this issue should continue to be developed based on the specific needs in the respective countries. This should intensify efforts in the education and training sector and lead to concrete activity in the operative sector. The merit and workability of such issues and potential projects must be reviewed.

Long “development times” are necessary before a program can actually begin: any serious EZA requires that the program fulfill the minimum criteria of ownership by the focal country and fulfill all other economic and socio-ecological demands – a time-consuming process. In addition to undertaking the effort required to develop such a new program, EZA in Austria is willing to enter into the medium-term commitments that all such projects entail in order to guarantee the program’s success in preserving traditional field varieties.

EZA principally incorporates biodiversity issues from three perspectives:

- by setting activities with immediate ecological objectives
- by initiating measures with other primary goals, but that are directly useful for the environment and biodiversity

- by reviewing the ecological impacts of every projects at all program levels (Provincial and Provincial sectoral programs)

On the project level, environmental impact assessments are now mandatory. Austria has not restricted itself to formally defining the assessment processes; rather, it submits the plausibility of all environmental impact statements to scrutiny by an independent and competent Austrian firm. Formalized procedures for assessing strategic environmental consequences at the level of policies and programs are currently still missing due to insufficient experience. The assessments themselves, however, are being conducted.

Goals

- Finalize a policy governing the preservation of traditional field varieties
- Formulate a clear, implementible strategy design for such a program
- collect and file additional experience gained during strategic assessments of the impacts of individual policies and programs on biodiversity

Measures

- An intensive technical dialogue with scientists and farmers must be initiated under the direction of the agriculture bureau of the Federal Ministry of Foreign Affairs, in cooperation with all other relevant bureaus at the various Federal ministries; it must have adequate input from outside experts. Draft outlines of policies and strategies should be confronted with concrete experience; this approach will yield practical, viable tools within acceptable time frames.
- Greater efforts should be devoted to drafting strategic “assessments” on the program and policy level.

8 Indigenous peoples

Most indigenous peoples live in areas characterized by high biodiversity. Over the past few years, awareness has been building in industrialized countries of the West that these peoples are the best guarantors that the environment, the ecosystems and their biodiversity will be protected and preserved. These native inhabitants master a broad range of traditional production processes, strategies and structures (e.g. the flexible production methods typical of rural subsistence economies) that have been adapted to local conditions over the ages.

Due to their knowledge about environmentally compatible lifestyles, the integrity of indigenous peoples has been under severe pressure for some time now. On one hand, intensive efforts are underway to document, utilize and, ultimately, to commercially exploit the knowledge and technologies of indigenous peoples and their history. In some cases this is carried out under the guise of environmental protection, the global validity of indigenous cultures, and the well-being of all mankind. On the other hand, the interest shown by industrialized countries induces many members of indigenous tribes to seek markets and the market economy.

The traditional lifestyles of indigenous peoples and their forms of co-existence, which regulate the manner in which knowledge is handed down and how natural resources are handled, are very diverse. All tend to differ considerably from those of industrialized countries. The Western concept of “intellectual property” stands in particular contrast to the views that indigenous peoples have about the intellectual rights to knowledge.

Today, this makes it imperative that indigenous peoples find new methods to legally protect their traditional knowledge and biotechnologies. The following goals have priority: protect traditional knowledge, which often has religious meaning; protect their integrity and identity; maintain their independence and the right to self-determination, especially in the economic sector; financial reimbursement for marketing their knowledge.

In certain cases the above goals conflict with one another: accepting the monetary system of industrial nations and preserving identity are not necessarily compatible. Strengthening indigenous rights to traditional knowledge and biotechnologies is an important aspect in the struggle for self-determination.

Marketing traditional, indigenous knowledge poses the following threats:

- **“Expropriation” of knowledge and biotechnologies**

Loss of control over indigenous knowledge

Eroded basis for subsistence and income

Growing pressure to expropriate resources

- **Devaluation of knowledge**

Destruction of holy sites of indigenous peoples

Loss of cultural identity

- **Marketing of knowledge, biotechnologies and natural resources**

Loss of integrity and mutual knowledge
Drift toward destructive practices
Destruction of natural resources
Loss of biodiversity

Legal basis for securing indigenous control

Above and beyond Western law, which guarantees the right to property, a number of contracts and declarations by organizations such as the ILO, UNESCO and FAO deal with the traditional knowledge and biotechnologies of indigenous peoples.

Development of indigenous peoples

The Convention on Biological Diversity defines biotechnology as any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

Free market

For indigenous peoples, the Convention on Biological Diversity means more than mere protection. On one hand it enables them to obtain patents for part of their knowledge and to enter into a process of “modernization”. On the other hand, through trade and the commercialization of their products, they run the risk of becoming estranged from their traditional lifestyles and becoming pawns of market forces.

Goals

- The policies of the European Commission regarding indigenous peoples should continue to be actively pursued during the Austrian presidency.
- A balanced and fair sharing of the advantages arising from the use of genetic resources
- Support for initiatives that are designed to fairly reimburse indigenous peoples
- EZA must fully consider the interests of indigenous peoples

9 The ecological approach

9.1 Ecosystem protection

Efforts to preserve biodiversity can only prove successful if the organisms (communities) are viewed in the context of their physical and chemical environment. The ecosystem concept recognizes organisms as key components of this biological-physical-chemical entity, within which the individual populations of organisms undergo continual dynamic interactions both with each other and with the chemical and physical processes surrounding them.

The dynamics of the various processes determine stasis or change in the ecosystem. Globally, the balance within energy and material cycles, which reflects the build up and degradation of biomass, plays a decisive role. This, in turn, is dependent on the actions and reactions of the full range of organism types involved in these processes; in a sense, they are positioned at the control centers of operational ecosystems. Maintaining the quality and function of an ecosystem over the long term requires guaranteeing the survival of the component organismal communities; failure to do so necessitates continual human (technical) interventions (e.g. torrent and avalanche control, crop protection). Any change of the physical or chemical framework (e.g., pollutant loading, climate) affects communities of organisms and sooner or later the entire ecosystem.

Ecosystem dynamics is coupled with the dynamic trends in biodiversity. These trends alter – in the form of periodic or progressive changes – species composition and diversity based on phases of decay, reorganization and stability.

Any strategy designed to preserve biodiversity must therefore also strive to preserve ecological integrity, i.e. to maintain the dynamic processes characterizing the ecosystems and to maintain the biodiversity typical for the individual successional stages (“qualified, authentic biodiversity”).

9.2 Protection of endangered groups of organisms

The spatial boundaries between individual ecosystems are generally fluid, because ecosystems are “open systems” in the sense that energy and material flows (for example, solar energy, CO₂) as well as organisms penetrate and later exit from them. Many animal populations periodically or concurrently use a number of different ecosystems. This is the case in species that undergo seasonal migrations (migratory birds, long-distance foragers among the bats, short- and long-distance migrations in the deer family, amphibians, peregrine falcons, etc.); it also holds true of those species whose members effectively partition resources by concurrently inhabit different ecosystems using complex strategies in space and time, specifically by segregation according to sex, reproductive status or social rank. Preserving such highly mobile wildlife that is adapted to utilizing a set of several ecosystems entails preserving the spatial and temporal cohesion of those ecosystems.

Human beings, especially urban dwellers, provide a convincing example of how necessary intact interactions between various different, often widely separated ecosystems are. Mankind exploits these relationships to cover various needs such as drinking water, food, waste disposal, recreation, etc., which the urban ecosystem cannot meet. The sustainable development of entire regions depends on the long-term, autonomous integrity of the remote ecosystems they rely upon. Human beings, as an integral part of the ecosystem, must orient their exploitation strategies on the long-range preservation of these system functions; this must be done as a matter of principle and on a regional scale.

Special measures are required to preserve species that utilize several ecosystems, as well as to protect those animals and plants that are acutely endangered either because they are naturally rare or highly specialized for particular biotic and abiotic conditions. Such measures go beyond conserving particular sites and habitats to include appropriate management and restoration activities (action plans).

Ecosystems whose preservation has high priority in Austria

Rivers, wetlands, meadows, forests, mountains and caves

Groups of organisms whose protection in Austria requires special action plans

The goal here should be to draft a complete list of all such organisms under the auspices of recognized experts. "Flagship" species with well-known ecological demands and biology should then be selected from the overall list; their preservation will help safeguard the distribution and ecology of related species-groups.

Strategies

Preserving biodiversity initially requires compiling and, as necessary, supplementing all the available scientific information on the distribution and status quo of biodiversity. This data should enable actual protection to be achieved within a period of no more than 10 years, whereby both relevant EU guidelines (Bird Protection Directive and Fauna-Flora-Habitat Directive) along with the conventions already ratified by Austria are to be applied. The requirements of migratory species must be given special consideration.

In a continent as densely populated as Europe, preserving biodiversity cannot ignore socio-economic issues. Efforts to protect biodiversity must integrate all social and economic sectors, including agriculture and forestry, energy production and consumption, industry, hunting and fisheries, mining, raw material extraction, tourism, the leisure industry, recreation, transportation, water resources management, as well as land-use planning and regional policy. The following principles, in line with the "Panneuropean Strategy for Biological and Landscape Diversity", are to be applied for the long-term preservation of ecosystems:

Principles

- Careful consideration in all decisions

Decisions on interventions with negative impacts on biodiversity must be made based on the best-available information.

- Precaution

Mandatory requirement that all interventions with potential negative impacts on biodiversity be subject to procedures designed to predict the repercussions.

- Caution

Even when negative impacts on biodiversity remain to be proven, potentially damaging interventions should not be carried out.

- Motivation and information

Improve the motivation to protect biodiversity through information campaigns and public relation work.

- Apply best available technology

Access to and application of optimal technologies to prevent damage to biodiversity must be guaranteed.

- The polluter-pays-principle

Those persons who are responsible for damage must pay for that damage

- Common burden principle

If certain damage cannot be attributed to any one person, then government funds must be used to repair the damage.

- Compensatory principle

Services that go beyond the external effects of proper management should be reimbursed by the favored person (e.g. contractual nature conservation, closed forests, water rights)

- Balancing of interests

The protection of biodiversity must heed the interests and needs of the local population. A consensus should be sought between the property owners and by rightful users by balancing interests.

- Public involvement and public access to information

The approval of any project that negatively impacts biodiversity must involve the public and transparent decision-making processes.

- Education and training

Formal and informal education and training must promote a modern approach to biodiversity

- Site shifts

Whenever particularly damaging interventions are unavoidable, they should be carried out at locations where they inflict the least damage.

- Restoration

To the extent possible, damaged ecosystems and their characteristic species should be restored.

Abbreviations

ATS: Austrian Shilling
BAB: Bundesamt für Agrarbiologie
BFL: Bundesamt und Forschungszentrum für Landwirtschaft
BM: Federal Ministry
BOKU: University of Agricultural Sciences
CGIAR: Consulting Group for International Agricultural Research
CIPRA: International Commission for the Protection of the Alps
CITES: Council for International Trade in Endangered Species
ECP/GR: European Cooperative Programme/Genetic Resources
EMAS: Eco-Management and Audit Scheme
EU: European Union
EUFORGEN: European Forest Genetic Programme
EZA: Development and Aid
FAIR: An EU research program on agriculture and fisheries
FAO: Food and Agriculture Organization
FFH-RL: Fauna-Flora-Habitat Directive
GATT: General Agreement on Tariffs and Trade
ICARDA: International Center for Agricultural Research in Dry Areas
ILO: International Labour Organization
IPGRI: International Plant Genetic Resources Institute
IPPC: Integrated Pollution Prevention and Control
NGO: Non-Governmental Organization
NUP: National Environmental Plan
ÖNGENE: Österreichische Nationalvereinigung für Genreserven
ÖPUL: Program to promote environmentally sound, extensive agriculture that protects natural habitats
RL: Directive
UBA: Federal Environmental Agency
UNCED: United Nations Conference on Environment and Development
UN/ECE: United Nations/Economic Commission for Europe
UNESCO: United Nations Educational, Scientific and Cultural Organization
UNIDO: United Nations Industrial Development Organization
UPOV: International Union for the Protection of Plant Varieties
UVP: Environmental Impact Assessment
VN: United Nations
VO: Regulation
WIEWS: World Information and Early Warning System
ZAR: Zentrale Arbeitsgemeinschaft österreichischer RinderzüchterInnen