

Close-to-Nature  
Forest Management  
in Slovenia



ZAVOD za GOZDOVE  
SLOVENIJE

Slovenia Forest Service

# FOREST MANAGEMENT BY MIMICKING NATURE

How to conserve forests by using them

## About this book

*Preservation of Slovenian forests and their biological diversity should not be ascribed solely to diverse natural and climate conditions. It is the result of a centuries-old tradition of planned forest management, which always used natural processes to achieve its objectives. Slovenian forestry recognized close-to-forest management as a key to a successful economic exploitation of forests as well as their preservation, and conservation of their biological diversity. Well preserved and biologically diverse Slovenian forests are the pride of Slovenian forestry as well as a challenge to foresters to continue a good work of their predecessors. Foresters, who introduced principles of close-to-nature management centuries ago, when nature was not considered endangered were indeed farsighted and brave in their pioneering efforts. This brochure is dedicated to all the experts, who helped preserving Slovenian forests in the past, and will hopefully inspire the present and future generations to follow their example.*

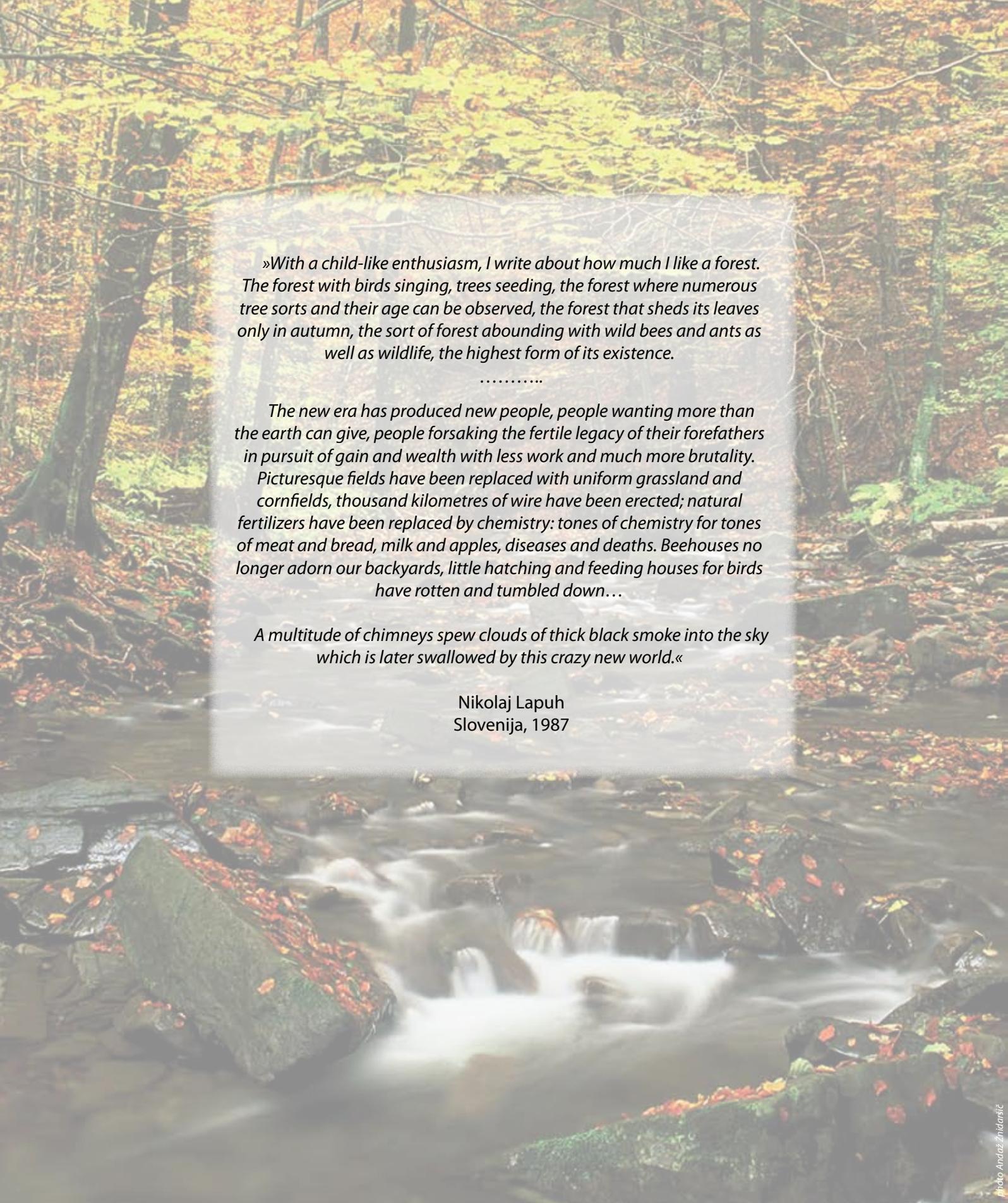
*Jošt Jakša, Director  
Slovenia Forest Service*

Global consensus was reached at the Rio de Janeiro Environment Conference, with regard to the necessity of sustainable management of nature. This is further affirmed by environmental changes, which have become more pronounced in recent years. However, the issue of ensuring sustainable development remains unsolved. Whereas some promote the use of new technologies within only slight changes in the wasteful lifestyle of the developed world to solve the problems, others seek solution in moderate consumption and adapting to nature, requesting a striking break with ingrained habits. Forests, which are critically endangered at a global level and significantly influence natural processes, can be developed in accordance with different theoretical models, i.e. new forestry, the ecosystem approach, sustainable management. The above mentioned divergencies of interpretation and different theoretical viewpoints present an obstacle in decision-making process related to future use of natural resources. It is therefore important to present the existing best practices of long-term forest management, which is the purpose of the brochure.

Close-to-nature forest management has developed in different parts of Europe, but has been widely used especially in vulnerable Alpine regions. This brochure presents the concept of close-to-nature forest management in relation with other approaches, its essential characteristics and the main obstacles to sustainable development. Close-to-nature forest management is, like holistic medicine and biological farming, criticized for using unscientific, inexperienced approaches. There have been several reasons for this, from the lack of natural forests and research, complexity and sustainability of forests, to financial interests supporting conventional forest managements. A decisive breakthrough to impartial performance evaluation of close-to-nature forest management was a control method presented in this brochure as well as recent certification schemes. However, there is one important difference between certification and control methods: whereas the first specifies the minimum requirements, the second promotes sustainable improvement of management – meaning to the best practice.

Forestry faces increased demands on the resources of forests, such as the exploitation of renewable natural resources to the most possible extent and consequently increased felling in Europe, adaptation to climate change, growing recreational needs and preservation of biological diversity. Use of close-to-nature forest management to balance all needs proves that this is not an obsolete forest management practice but a flexible, continually developing approach. Because of its beneficial environmental impact and long-term economic sustainability, close-to-nature forest management is becoming more popular in Europe ([www.prosilvaeurope.org](http://www.prosilvaeurope.org)) and makes an important contribution to improving the quality of life. Close-to-nature forest management, which was developed more than a century ago in endangered and degraded European regions, is considered as very likely to help solving environmental problems on a global scale and creating sustainable global society.

Prof. Dr. Jurij Diaci



*»With a child-like enthusiasm, I write about how much I like a forest. The forest with birds singing, trees seeding, the forest where numerous tree sorts and their age can be observed, the forest that sheds its leaves only in autumn, the sort of forest abounding with wild bees and ants as well as wildlife, the highest form of its existence.*

.....

*The new era has produced new people, people wanting more than the earth can give, people forsaking the fertile legacy of their forefathers in pursuit of gain and wealth with less work and much more brutality.*

*Picturesque fields have been replaced with uniform grassland and cornfields, thousand kilometres of wire have been erected; natural fertilizers have been replaced by chemistry: tones of chemistry for tones of meat and bread, milk and apples, diseases and deaths. Beehouses no longer adorn our backyards, little hatching and feeding houses for birds have rotten and tumbled down...*

*A multitude of chimneys spew clouds of thick black smoke into the sky which is later swallowed by this crazy new world.«*

Nikolaj Lapuh  
Slovenija, 1987

*»Nature, to be commanded, must be obeyed.«*

*Francis Bacon, Novum Organum*

Forestry, which is in charge of one of the crucial ecosystems on Earth, can significantly improve the state of the world.

CLOSE-TO-NATURE FORESTRY uses forest management methods that promote conservation of nature and forests, as its most complex creation, while deriving tangible and intangible benefits from a forest in a way to preserve it as a natural ecosystem of all its diverse life forms and relations formed therein.

CLOSE-TO-NATURE FORESTRY is based on forest management plans adapted to individual site and stand conditions as well as forest functions, and considering natural processes and structures specific to natural forest ecosystems. Natural processes are altered as little as possible, while still maintaining the financial profitability and social sustainability of forest management. Similarly to natural processes, CLOSE-TO-NATURE FORESTRY also contains inbuilt mechanisms for continual internal checks (controls) providing timely response to modify measures adapted in accordance with developmental characteristics of single forest stands and a forest as a whole.

Characteristics of close-to-nature forest management:

- Preservation of natural environment and ecological balance of the landscape;
- Sustainability of all forest functions;
- Integrated approach to a forest ecosystem;
- Imitation of natural processes and forms;
- Tree species suited to the site conditions;
- Based on cognitive approach – constant monitoring and learning;
- Based on long-term economic efficiency;
- Plans designed at a broader and more detailed level.

CLOSE-TO-NATURE FORESTRY, which is formally used in Slovenia for over 50 years, fully complies with the provisions of the ecosystem approach, as adopted in COP 7 in Kuala Lumpur from 9 – 20 February 2004.

## Close-to-nature forestry combines sustainability and the ecosystem approach

Close-to-nature forest management must be defined within the context of two basic concepts central to the international dialogue on forests and forest-related commitments: sustainable forest management and the ecosystem approach.

The concept of sustainable forest management was first used in political context with the Forest Principles adopted at the United Nations Environment and Development Conference in 1992 and later developed by the Non-Legally Binding Instrument on all Types of Forest adopted in 2007 to promote sustainable forest management and to set the following global objectives on forests:

1. Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation;
2. Enhance forest-based economic, social and environmental benefits including by improving the livelihoods of forest dependent people;
3. Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, and increase the proportion of forest products from sustainably managed forests;
4. Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased new and additional financial resources from all sources for the implementation of sustainable forest management.

Among seven thematic areas of sustainable forest management (CICI 2003)<sup>1</sup>, four are

related to the environmental aspects (extent of forest resources, biological diversity, forest health and vitality,

<sup>1</sup> <http://www.fao.org/docrep/005/J0077E/J0077E00.HTM>

protective functions of forest resources), and the remaining three to the social and economic aspects (productive functions of forest resources, socio-economic functions, legal, policy and institutional framework). The above mentioned thematic areas can be used as criteria and indicators for evaluating the effectiveness of forestry measures.

The ecosystem approach adopted at the 7th Conference of the Parties (COP-7) of the Convention on Biological Diversity (CBD), previously mentioned at the COP-5, is based on twelve principles presenting the strategy for the integrated management of aquatic and terrestrial ecosystems, and is therefore not limited only to forest management. In comparison to sustainable forest management based on balanced and sustainable achievement of economic, environmental and social values of forests, the priority target of the ecosystem approach is conservation of ecosystem structure and functioning, in order to maintain ecosystem services (Principle 5).

To implement the ecosystem approach, the following five points were proposed as



photo Robert Kraih

operational guidance:

1. Focus on the functional relationships and processes within ecosystems
  2. Enhance benefit-sharing
  3. Use adaptive management practices
  4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralisation to lowest level, as appropriate
  5. Ensure intersectoral co-operation
2. Management of stable and healthy forests, which regenerate naturally, if properly treated, in a way to mimic natural processes, is less expensive than cultivation of artificial stands which can be quite productive on a short-term basis, but are hard to preserve in a long term, due to their higher vulnerability in comparison to natural forests.

The comparative analysis of sustainable forest management and the ecosystem approach, (FAO: 2003)<sup>2</sup> established that the concepts were very similar and should be integrated and mutually supportive at all levels.

Whereas the importance of close-to-nature management to preserve biological diversity was not widely recognised in the past, it has increased in the last decades, since the adoption of the Convention on biological diversity.

The concepts of sustainable forest management and the ecosystem approach implemented under international commitments should be compared and checked against the historical development of forestry in Central Europe, especially the Alpine region, where the principles of sustainability and close-to-nature management have already been applied both in theory and in practice, and integrated in the legal framework of forest management.

While the ecosystem approach is important also as a complement to sustainable forest management within the framework of global forest policy, the principles of close-to-nature forest management represent an important added value to the principle of sustainability on operational level. Close-to-nature forest management is, therefore, a forest management practice where the goals of sustainable and multifunctional forest management are achieved through preservation of natural forest and silvicultural approach mimicking natural disturbances and processes. In this sense, close-to-nature forest management combines the principles of sustainable forest management and the ecosystem approach.

The principle of sustainability as a long-established forest management practice in Central Europe, focusing initially on sustainable use, has in the framework of modern sustainable forest management extended to all forest functions. In the Alpine region, where the forests are exposed to destructive natural forces and where multiple roles of forests are especially evident, the principle of sustainability was traditionally combined with close-to-nature management for two reasons:

1. Forests with protective functions should remain as stable and healthy as possible and such are naturally structured forests that have gone through millennial

<sup>2</sup> <http://www.fao.org/forestry/webview/media?mediaId=6417&langId=1>

## Short history of close-to- nature forest management in Slovenia

With 58% of forests, Slovenia has one of the highest percentages of forest cover in Europe. People are strongly attached to forests and treat them with all respect. Slovenia has a long history of forest management, dating back to 1406 when the first regulation regarding forest management, namely Ortenburg Forest Order, was published.

An ecosystem approach to the forest management was also implemented in Slovenian forestry long ago. Its beginnings date back to the 19th century when the selection forest management was developed in some parts of Slovenia as a response to the clear-cut silviculture system that produced monocultures of coniferous forests in most European countries.

The most important turning points of professional work with forests and implementation of an ecosystem approach to forest management in Slovenia are the following:

- In 1724, Forest Regulation is introduced to ensure sustainable wood supply for the needs of mercury mine in Idria, marking the implementation of forest management.

- In 1770, the first forest management plan is designed by Franc Flamek.

- In 19<sup>th</sup> century, the bare Karst is successfully afforested. Successful Karst afforestation receives a "Grand prix" at Paris World Exhibition in 1900. Today, forest covers about 52 % of the Karst



photo archive

Afforestation of the bare Karst – 1895 region.



photo Andraž Znidaršič

Today, the Karst is predominantly overgrown with forest

- In the second half of the 19th century, many large forest properties in Slovenia develop their own forest management plans. The most established experts in the field are Dr. Leopold Hufnagl, employed in the Kočevje region, and Heinrich Schollmayer, manager of forests on the Snežnik plateau.

With the forest management plan from 1892, Dr. Leopold Hufnagl establishes a unique selection system of forest management, which is later adopted also by Heinrich Schollmayer who is at the time manager of Snežnik forests. In 1906, Schollmayer's Instructions on forest management introduce full callipering of forest stands, the measurement of the growth by means of increment cores, analysis of sample trees to measure specific tree volume, tree species composition and many other indicators. Shollmayer calculated total increment of forests using growing stock measurement and full records of tree fellings, and established efficient forest management with careful examination of existing forest management plans. Exact forest assessments and detailed records on felling have provided valuable data on development of forest, dating hundred years back.

- In 1947, the first federal forest act in Slovenia within former Yugoslavia is adopted containing several important provisions regarding preservation of forests and professional forest management. It determined a compulsory making of forest management plans for all the forests, it prohibited clear-cutting and goat pasturing.

- In 1950's, Slovene forestry makes significant headway towards close-to-nature forest management with Dr. Dušan Mlinšek's theoretical and practical work.

- In 1989, ProSilva Europe, an international association for close-to-nature forest management, is established in Robanov kot, Slovenia.

- This efforts related to close-to-nature management practice resulted in inclusion of extensive part of Slovenian areas in Natura 2000 in 2004 when the areas of Natura 2000 were formed in Slovenia. They capture as much as 35 % of the total surface of Slovenia and as many as 50 % of all Slovenian forests.

In the last 130 years, forest area has been increasing in Slovenia as the percentage of growing stock and increment has been in increase for more than 50 years.



photo Edo Kozarog

*Prof. Dr. Dušan Mlinšek successfully combined theoretical knowledge and practical experience on forests to develop a modern approach to forest and environment management. He is one of the pioneers of sustainable, multipurpose and particularly close-to-nature management. Dr. Mlinšek introduced the practice of close-to-nature management in 1950's, which has still been widely used for more than fifty years in Slovenia.*

## Close-to-nature forest management conserves ecological balance in the landscape

### Characterisation

A forest as one of the mostly preserved terrestrial ecosystems plays an important functional and visual role in the landscape and should therefore be preserved and managed in a way to maintain its naturalness and beneficial effects on broader environment.

### Explanation

Forests and remains of forests are the last pieces of natural environment and essential component of the landscape used for the preservation of ecological balance in a country already occupied by buildings, technical facilities and otherwise changed or affected environment. They are habitat of many indigenous plant and animal species and the most important source of healthy drinking water, and they protect soil and other buildings against weather extremities, such as landslides, storm waters and floods, and are often visited by people seeking relief in nature.

Appropriate share of forests or their remains in their most natural form and stand is essential for ensuring all those features and benefits in the landscape, which can only be provided in preserved nature.

### Examples

The forest area lies in southern Slovenia and is a habitat of bear, wolf and lynx populations.



photo Špela Habič

In accordance with provisions from a forest management plan, public forest service issues professional instructions to forest owners regulating management of separate trees and forest tree groups outside populated areas considered to be important habitats and treated as living environments of wildlife. Works executed according to the instructions are co-financed.



photo Hrvoje Oršanić

A forest maintains ecological balance and gives the landscape more natural look.

A landscape without forest is extremely functionally and visually bereft. In such landscape every single tree is precious.



photo Matjaž Čater



photo Špela Habič

**Issues to be addressed:**

- Pressures on forest areas in suburban and other areas already lacking forests;
- Land-owners wish to cut down forest patches to round up plots of land for agricultural purposes.

## Close-to-nature forest management is sustainable in preserving all forest functions

### Characterisation

Preservation of the forest and its all ecological, productive and social functions is main characteristics of close-to-nature forest management.

### Explanation

Management of the forest as one of the crucial renewable sources in the world must contribute to sustainable development of society. This can be achieved only through maintenance of healthy forests and their biodiversity, protection of surface and water sources as well as other beneficial functions of forests in the water and carbon cycle, sustainable supply of wood and other products from forest, profit and employment as well as means of recreation and other cultural benefits related to forests. Forests should be managed in a way to preserve their multifunctional role.

Forest preservation should be particularly emphasised in environments in need of their ecological and social functions. Diversity in stand structure and species composition as well as growing stock of forests ensures their biodiversity and stability as well as profitable wood production and beneficial influence on the carbon cycle.

People need forests for relaxation and other social purposes, therefore this need should also be considered in forest management, especially in urban and suburban areas.

In most cases, the coordination of many various forest functions is not problematic. If the roles of forest contradict each other and a particular role is considered to be of public interest, a forest in private ownership is declared a special purpose forest, and an agreement is reached between the owner and authority granting the owner right to compensation or request that the authority purchases such forest.

### Examples



photo Andraž Žnidaršič

A forest is a source of healthy drinking water.

Wood is used as construction material, raw material and as fuel.



photo Janez Konečnik



photo Spela Habič

In Slovenia, people have free access into all forests and can gather forest products, mushrooms, plants and hunt animals.

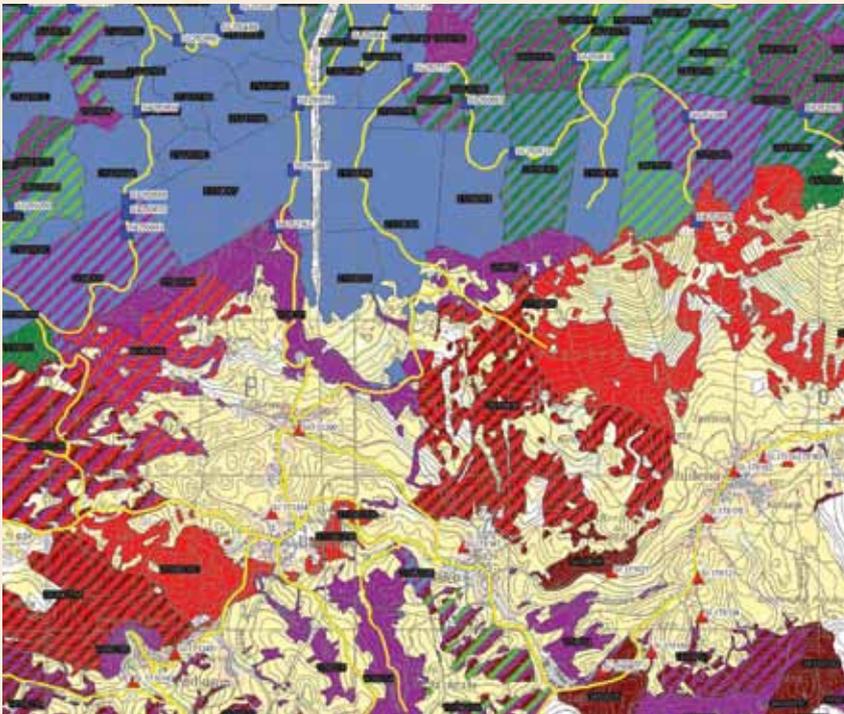


photo Janez Konečnik



photo Spela Habič

Slovenia Forest Service was involved in making the Rules concerning the methods and standards of bee pasture.



**LEGEND**

**Land use classes**

- Field
- Orchard
- Grassland
- Urban area

**Tree species**

- Maple - above 5 %
- Norway spruce - above 20 %
- Silver fir - above 10 %
- Scotch pine - above 10 %
- Cherry - above 5 %
- Lime - above 5 %
- Oak - above 15 %
- Chestnut - above 5 %
- Black locust - above 5 %

- Roads
- Water surface
- Permanent beehouse
- Location for mobile beehives

The map of the Rules on bee pasture management

**Issues to be addressed:**

- Partly unsuitable ratio of developmental phases of forest stands;
- Very fragmented forest property – difficult for sustainable forest management;
- Pressures to allow forest property for so far forbidden uses (snowmobiles, motorcycles and four-wheelers, etc.);
- Use of forest functions that exclude each other.

## Close-to-nature forestry uses integrated approach to forest ecosystem management

### Characterisation

Species-rich and structurally diverse forest ecosystems distinguished by complex relationships between animate and inanimate worlds, as well as by relationships occurring within each of these worlds, should be managed in a way to respect and preserve all their components as well as disturb their relationships in the least possible way to maintain dynamic balance of forest ecosystems.

### Explanation

Forest ecosystem is a complex natural system of an animate and inanimate world. Bed-rock, hydrological conditions and other factors of animate and inanimate nature have created soil and living environments particular to a single piece of forest. The forest ecosystem exists and develops as a unit. Functions of single elements and their complex relationships are not completely explained; they also constantly change in time and space. Limited approach to a forest (such as from the aspect of wood production) or introduction of new elements into the forest ecosystem can have unforeseen, even grave consequences for the forest ecosystem.

### Examples



photo Janez Konečnik

In Slovenia, every region determines common forest management and wildlife management plan.

Close-to-nature forestry considers spatial and time restrictions regarding forest works to adapt to the biorhythm of forest animals. In Slovenia, the most important restrictions are stipulated by law.



photo Edo Kezarog

Because of high significance of forest to environment and people, the state co-finances silvicultural and conservational works in forests. A share of invested funds into forests depends on ecological and social functions of a developed forest.

Dead wood in forest is very important for life in a forest.



photo Mirko Perušek

Slovenia has a regulation which determines that wood debris should be left in a forest after harvesting.



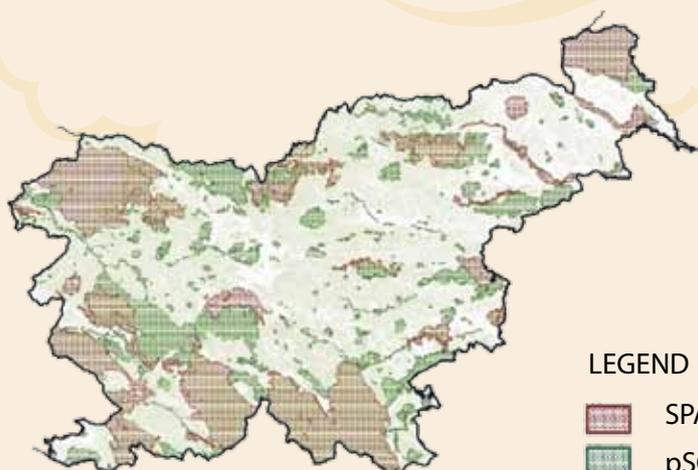
photo Robert Vidervol

Forest's naturalness is enriched with key habitats, which are left to develop completely naturally.



photo Rob. Pišek

Management of Natura 2000 forest areas is included into forest management plans. Public forestry service and Institute for Nature Conservation are cooperating successfully on this area.



LEGEND

-  SPA
-  pSCI

**Issues to be addressed:**

- Various partial interests of forest owners, stakeholders, investors, etc.

## Close-to-nature forestry mimics natural processes and structures

### Characterisation

Directed development of forest ecosystems should imitate processes and structures of natural forest ecosystems as far as possible. Forest stands should be renewed naturally and should imitate mixture of tree species and forest stands of natural forests.

### Explanation

During thousand years, forests have developed typical relations, processes and structures which enable their (relatively dynamic) stability and further development. Many of these relations and processes as well as structures remain unknown, only crucial, easily detectable ones are observed. When directing development of a forest ecosystem, recognized natural processes and structures should be mimicked as far as possible to ensure the functioning of forest in its larger "unseen" part.

Forest management can directly influence the tree stands in a forest ecosystem. Trees are the crucial element of a forest ecosystem since they produce the most organic matters in a forest as well as containing the most organic matters in a forest. Only with natural regeneration of forest stands, trees' adaptability to conditions of specific growing sites, evolved in thousand years, is preserved, and only with natural afforestation, this evolutionary adaptation of a certain tree (sub) species to a certain growing site is preserved, in the process of mass selection of young trees from sprouts to mature stands.

Silvicultural systems should be carefully selected in an order to promote close-to-nature approaches and mimic natural processes in forest stands (Femel system, selection system).

### Examples

Forests growing in different sites and consisting of different tree species tend to form typical forest stands.



photo Špela Habič

Even-aged beech stand.

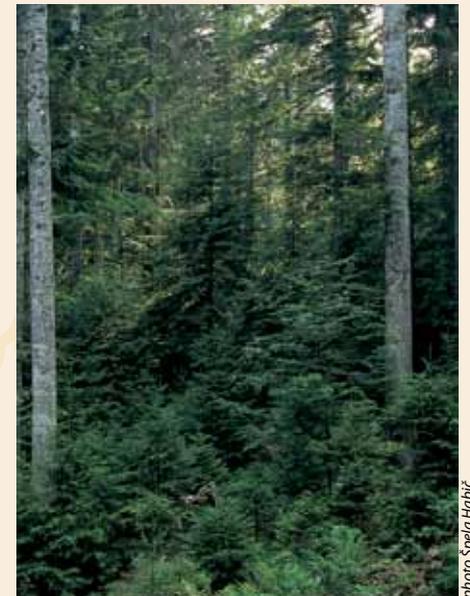


photo Špela Habič

Fir-beech forests tend to develop in selection structure.



photo Spela Habič

In extreme climate conditions of the upper forest edge, trees grow in bunches.



photo Spela Habič

In Slovenia, 95 % of forests are afforested in a co-natural way.

### The naturalness of Slovenian forests



#### LEGEND

- Preserved
- Partly modified
- Modified
- Altered



photo Matjaž Čater

Unnatural coniferous stands are transforming into more natural ones with reforestation with deciduous trees. Picture of the Pohorje forests.

#### Issues to be addressed:

- In places, disturbed balance between herbivores and vegetation in a forest environment;
- Decreased resistance of forests due to climate changes (increase of bark beetles, new diseases);
- Damages of forests due to bad weather and fires;
- Difficult professional forest management due to fragmented forest ownership.

## Close-to-nature forestry adapts to growing site characteristics

### Characterisation

Forest development should be directed in a way to adapt to individual characteristics of a specific growing site based on ecological and economic needs.

### Explanation

Geology and climate have shaped Slovenian territory in a very diverse country. Site characteristics normally change in short distances. If we want to preserve these characteristics and benefit from their specifics to the maximum extent, suitable mixed tree structures and forest stands should be used.

Directed development of forest stands adapted to individual site and stand conditions, and forest functions demands great flexibility in selection of a proper system (method) of forest management and careful planning of measures.

### Examples

The structure and tree species composition of stands depend on altitude, relief and exposure.



Larch stand in Julian Alps.

photo Rok Carman



Black alder stand in flood plain area.

photo Špela Habič



photo Špela Habič

Frost localities characterized by the inversion of temperature are typical for Dinaric mountain range.



photo Špela Habič



photo Rok Pišek

Site characteristics change over relatively short distances, which can be quickly noticed on tree stands in close-to-nature managed forests.

**Issues to be addressed:**

- Need for site maps and thoroughly skilled district foresters;
- Tendency to manage forest uniformly in large areas to increase work efficiency.

**Close-to-nature  
forestry is based  
on cognitive  
approach  
– constant  
monitoring and  
learning**

### Characterisation

Forest is a complex natural system, with characteristics not familiar to us in all aspects, and can therefore often react unusually to our measures. Forest development must be consistent with the complex systems management theory. The essential work of the system is to establish a framework for a long-term forest development and to provide close monitoring of its development and reactions to forest management measures. The lessons learned should be considered and included in further management activities in a forest.

A forest is a complex natural system. Consistently with the systems theory of management, forest response to our actions may be difficult to predict. Therefore its development and response to silvicultural measures could not be specified thoroughly.

### Explanation

Cognitive work with forests consists in developing specific forest stands based on practical knowledge obtained from work in a forest and in development of silvicultural measures of similar forest stands in similar site conditions.

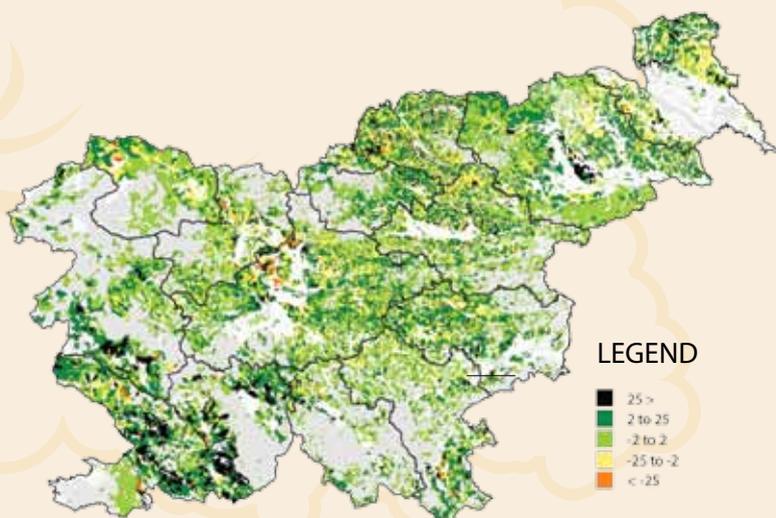
*“Forest management plans are not exhaustive and final, but should be changed and up-dated, generally as well as in details, to reflect modern trends in silviculture and forest management.” (Heinrich Schollmayer, 1912).*

In Slovenia, forest management plans that include analysis of previous management activities and determination of future development trends are designed for every ten years.

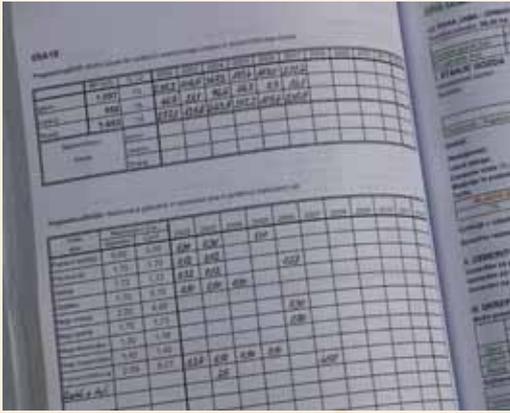
### Examples

Growing stock and increment is measured on permanent sample plots.

Average change in pine growing stock ( $m^3/ha$ ) in the 10-year period between 1970-2003 (Aleš Poljanec, 2008).



Specific elements of forest demand special monitoring methods. The populations of large carnivores are monitored on permanent monitoring sites, DNA analysis and GPS telemetry.



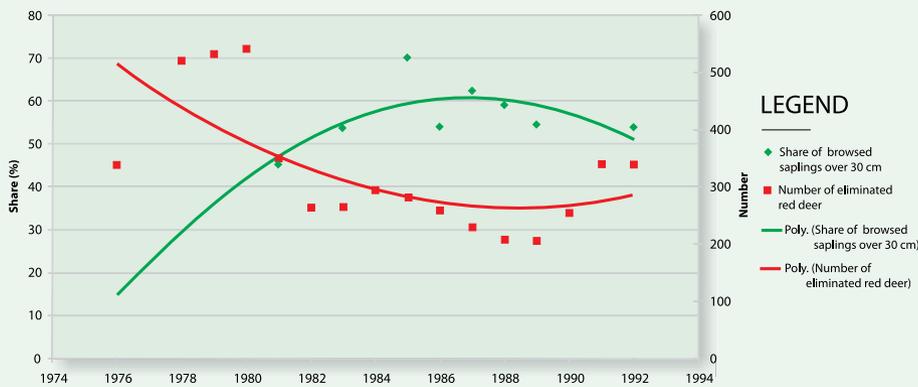
Records are the essential part of a follow-up of our work.



In local forest units, foresters write annual forest ledgers to include events and data from the previous year relevant and important in the light of forest management.

Consistency between population of herbivorous wild animals and forest environment is monitored on forest's sample sites, where the degree of damage on young growth is determined periodically.

The interrelation between the elimination of red deer and the condition of forest young growth (Postojna region, 1976-1992)



### Issues to be addressed:

- Data cannot reflect all knowledge;
- Staff fluctuation, which does not enable a forester who planned and carried out the measure to analyze the response of a forest and effectiveness of the measure taken.

To study natural development of forests, 172 total forest reserves were determined with total area of 9600 ha.



photo Janez Konecnik

**Close-to-nature  
forestry is  
committed  
to long-term  
economic  
efficiency**

## Characterisation

Close-to-nature forest management enables a long-term sustainable exploitation of site capacities without negative consequences for the environment. Long-term economic efficiency, which is objective of close-to-nature forestry, takes into consideration economic benefits of preserved environment.

Close-to-nature management measures are reasonable since they are based on the nature of a forest ecosystem to produce wood, regenerate itself and to provide all other processes necessary for its existence and development. Therefore all advantages of a forest ecosystem should be considered in the light of economy, and only minimal amount of energy required should be invested in directing production and other processes towards our production and other goals that are expected from a forest.

## Explanation

Wild fauna and flora are an irreplaceable part of the earth's natural system and should be conserved for the good of mankind. Environmental pollution and destruction of nature always has serious negative effects on economy, which can be avoided if the environment and nature are managed in way to preserve them as much as possible.

The energy that green plants derive from sunlight is used in a forest ecosystem for growth and maintenance of matter and energy cycles. The goal of forest ecosystem vaguely reflects our production goals in forest management when considering production of organic matter and its accumulation in wood and other materials. Specific requests in relation to a forest ecosystem, such as production of quality wood or slightly changed composition of tree species, can be achieved with minimal investments of energy precious even to us, with which we merely direct development of a forest stand towards our goals.

Maintenance of forest stands is a basic tool in directed forest management. In regeneration phase, maintenance means creating beneficial site conditions for a target forest stand. Later, when trees in our forest stand are thinned and their individual features are clearly seen, the trees for cut should be selected individually on the basis of their characteristics and specific goals we would like to achieve.

Only environmentally sound technologies should be used in harvesting, building and maintenance of forest roads.

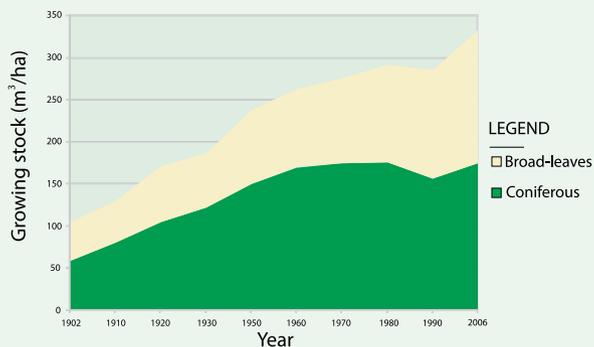
## Examples

Snežnik holding is one of the cradles of a planned close-to-nature forest management in Slovenia where felling multiplied by 5.2 between 1902-2006 in comparison to total wood stock in 1902, while the growing stock multiplied by 3.14 (from 105.7 m<sup>3</sup>/ha to 332.0 m<sup>3</sup>/ha).

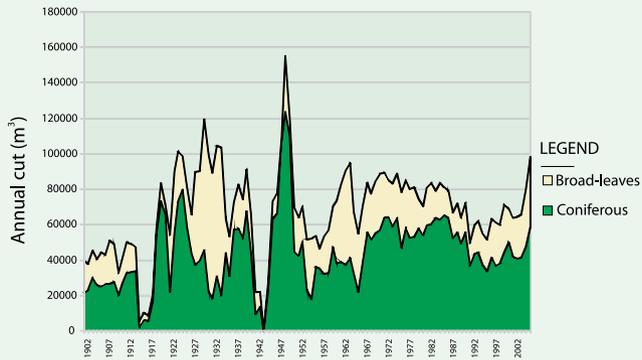


photo Spela Habič

Growing stock of Snežnik forests in the period 1902 - 2006



Annual cuts in Snežnik forests in the period 1902 - 2006



Indirect care for young growths in the shelter of old trees, the economic way to grow high-quality wood.



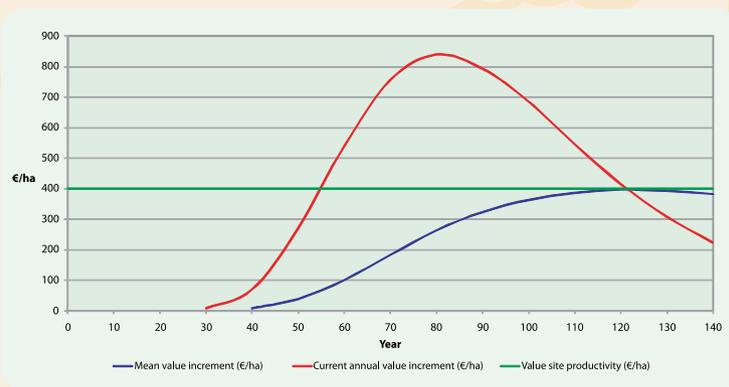
photo Andraž Žnidaršič



photo Andraž Žnidaršič

Maintained forest stands provide valuable wood assortments.

Stand renovation should be decided on the basis of value increment culmination and other indicators (if necessary).



**Issues to be addressed:**

- In places, disturbed balance between herbivores and vegetation in a forest environment;
- Natural disasters and fires;
- Fragmentation of forest property;
- Damages in forests (trees, ground) due to forest exploitation.

## Close-to-nature forestry needs to plan measures at a broader and more detailed level

### Characterisation

Adaptive forest management based on site and stand conditions as well as forest functions, with a flexible selection of a silvicultural system and measures optimal for specific conditions, requires careful and at the same time flexible (adaptive) forest planning based on careful and detailed enough study of growing sites, stands and forest functions as well as on cognitively established decision-making regarding the most suitable silvicultural system.

### Explanation

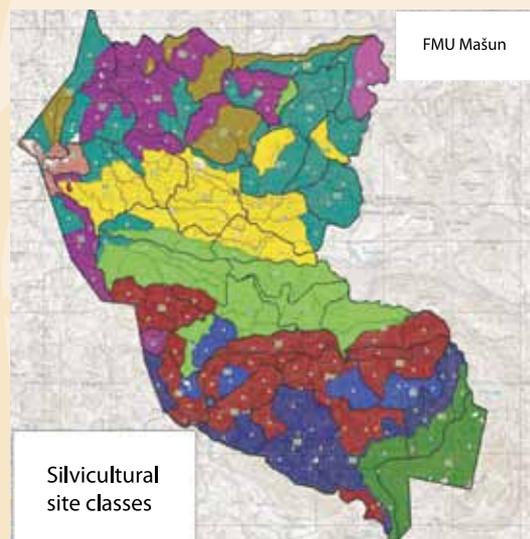
Professionally demanding selection of a forest management system and measures based on site and stand conditions as well as on forest functions can be carried out only with careful detailed forest management planning, within enough data on site and stand conditions as well as forest functions is collected, arranged in clear or manageable form and examined to select the optimal system of forest management and optimal measures for specific forest stands

### Examples

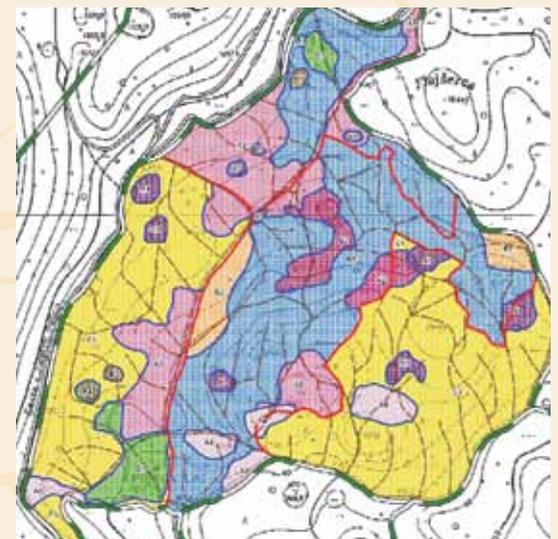
Forest management plans have been designed for more than 200 years in Slovenia.

In Slovenia, forest management plans are made on tree levels:

- Design of 10-year regional plans (forest management plans and hunting management plans) (round 70,000 ha of forests);
- Design of 10-year forest management plans for forest management units (round 4,000 ha of forests);
- Design of detailed silviculture plans which are implementing plans of forest management plans for forest management units (round 50 ha of forests).



Map from a 10-year forest management plan of Forest Management Unit (2,690 ha)



The map of silvicultural plan for the FMU Mašun, Compartment 7 (72.13 ha)

Forest works require careful selection of technology. Terrain and stand conditions should be considered as well as commitment to minimal damage on forest stands and soils.



photo Mirko Perušek



photo Rok Pišek



photo Edo Kozorog

Forest management plans are coordinated within sectors and publicly available.

Professional discussion on silvicultural plan.



photo Špela Habič

### Issues to be addressed:

- Demanding coordination of contents of all the plans above to make efficient planning system;
- Due to fragmented forest properties it is difficult to organize participation of forest owners in design of forest management and silvicultural plans.

## Main tasks and activities of the Slovenia Forest Service



photo Hrvoje Orsanič



photo Klemen Jakša



photo Lujš Beguš

### Forest management planning:

- elaboration of forest management plans;
- collecting data on the state and development of forests and keeping databases;
- monitoring biological balance in forests;
- giving consent for interventions in the forest and forest space;
- co-operation in open-space planning.

### Silviculture and forest protection:

- elaboration of silvicultural plans and plans for forest fire protection;
- determination of necessary silvicultural and protection work in forests;
- marking trees for felling in co-operation with forest owners;
- realisation of sanitary projects;
- extension for forest owners in connection with financing work in forests from the state budget;
- extension for forest owners in performing silvicultural and protection work;
- providing seedlings and seeds of forest trees for forest regeneration;
- accepting realized works in forests, financed from the state budget or the EU funds.

### Forestry technique:

- directing and supervising construction and maintenance of forest roads;
- elaborating and keeping information system for forest roads;
- determination of traffic regime on forest roads in co-operation with forest owners and local communities;
- extension for forest owners for correct and safe work in forests;
- elaboration of technological parts of forest management and silvicultural plans;
- co-operation in introducing new technologies in felling, skidding and transporting wood from forests;
- control of felling sites in forests;
- advising on proper use of wood as an energy source.

### Wildlife and hunting:

- elaboration of regional hunting management plans;
- keeping records of kill and losses of wild animals;
- determination of measures to improve living conditions of wild animals;
- monitoring the state of large carnivore populations (brown bear, wolf, lynx);
- management of hunting reserves with a special purpose;
- assessment of damage done by protected animal species.

### Public relations and education of forest owners:

- popularization of forests and forestry;
- informing the public about the importance of forests and nature preservation;
- education and training of forest owners;
- co-operation in activities aimed at countryside development;
- developing study circles in the Slovenia Forest Service;
- management and popularization of forest educational, tourist and other theme trails;
- informing the public about forests, forestry and activities of the Slovenia Forest Service.

### Other fields:

- expert orientation in letting out work in state forests, supervising the realisation of work and accepting performed works by procurement of the Farmland and Forest Fund of the Republic of Slovenia;
- participating in research work;
- participating in international projects.

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