This project has received European Regional Development Funding through the INTERREG IIIB Community Initiative

Alpine Space KnowForAlp

Interreg III B

MULTIFUNCTIONAL FOREST MANAGEMENT IN NATURA 2000 SITES

Slovenian Forestry Institute

ZAVOD za GOZDOVE SLOVENIJE
Slovenia Forest Service

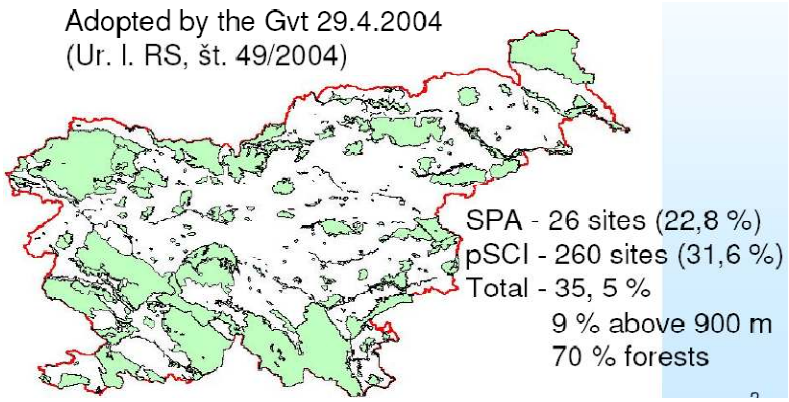
Contributions from the International Workshop held at Kočevje/Mašun, Slovenija in October 06

The **aim** of the workshop with field trips was to exchange views and possibly find common understanding on some important questions concerning management of mountain forests in Natura 2000 sites

NATURA 2000 in Slovenia and forests

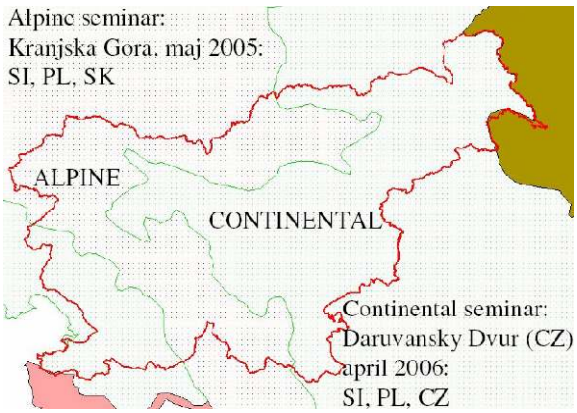
PETER SKOBERNE

On 24April 2004 the Government of Slovenia passed a Decree on Natura 2000 sites (Official Journal of RS, No. 49/2004). The standardized information on sites was delivered to the European Commission after accession on 1 May 2004.



Referring to the data by EEA/European Topic Centre on Biodiversity (June 2006), Slovenia has the 2nd largest national proportion of SPA in the European Union and the largest national proportion of terrestrial pSCI.

There are basically two main reasons for this. As Slovenia is situated between the Mediterranean, the Alps, the Dinaric system and the Pannonian plane, there are many Directives Annexes species and habitat types present – and more obligations to cover all of them. The second reason is that large carnivores require large Natura 2000 areas to meet their ecological requirements. The size of proposed pSCI areas for large carnivores is 2380 km^2 and is a reasonable area from the technical point of view. But in Slovenia, as a small country, this means 12 % of the national territory! The same area in France would amount to 0.4 % or in Germany 0.7 % of the territory. Therefore, the national proportion is not the best indicator. This is one of the reasons for using the sufficiency index.



There are two biogeographical regions In Slovenia: the Alpine and the Continental one. The sufficiency of national proposals for pSCI is thoroughly examined at the so-called biogeographical seminars. They in fact represent negotiations between the European Commission, supported by technical team (ETC on Biodiversity) and independent experts, representatives of the NGO's (delegate of the European Habitats Forum for each country involved), the European Labour Organisation and, of course, delegation of the Member states from the particular biogeographical region. The discussion takes place on species to species and

habitat type to habitat type basis.

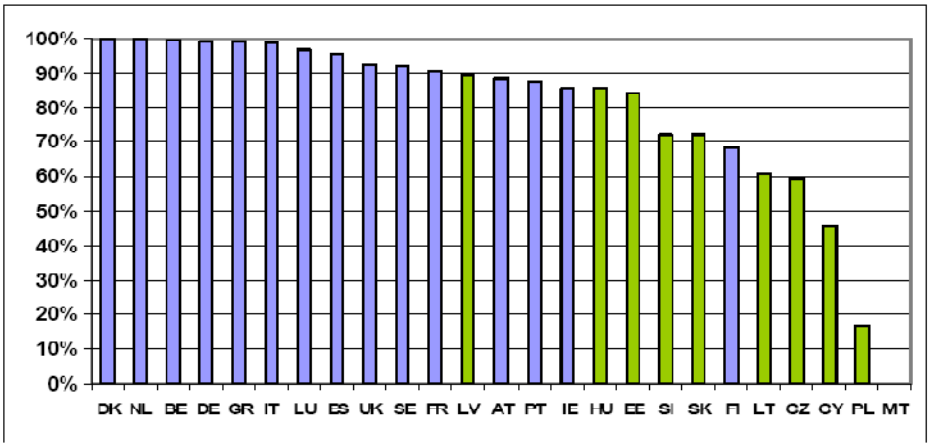
After discussion conclusion for each species or habitat type:

- SUF – Sufficient
- IN MIN – In minor – additions in existing areas
- IN MOD – In moderate – need for some new pSCI
- IN MAJOR – In major – no proposals or very insufficient
- SCI RES – Scientific Reserve

The sufficiency index is calculated from these results.

Concerning Slovenia, there were two biogeographical seminars:

- Alpine seminar in Kranjska Gora (Slovenia) in May 2005 (countries present: Poland, Slovakia and Slovenia);
- Continental seminar in Daruvansky Dvur (Czech Republic) in April 2006 (countries present: Poland, Czech Republic, Slovenia)



Source: Natura 2000 database, conclusions from Biogeographical seminars and DG Environment / Member States bilateral meetings held up to 15 September 2006. National lists transmitted to the Commission but not yet evaluated are not included.

Graph: Progress status by Member States in reaching sufficiency for the designation of Sites of Community Importance under the Habitats Directive: proportion of Annex I habitats and Annex II speices for which sufficient number of pSCIs have been proposed (September 2006).

Source: http://biodiversity.eionet.europa.eu/activities/Natura_2000/sufficiency_Sept2006.pdf

Despite the high national proportion of Natura 2000 in Slovenia, the sufficiency index after two biogeographical seminars is about 72 % (the 18th place in EU25 and the 4th place among new member states). This is partly due to some data mistakes. In some cases sufficiency will be reached by adding substance to the existing sites and some new sites have to be added to the original proposal.

Regarding proposals for the forest habitat types, sufficiency is almost complete. Only some minor amendments to existing areas are needed. The situation is not as favorable for some forest species. In some cases (e. g. mosses, forest bats, beetles) there are simply not enough data to make an immediate progress, therefore an additional research is needed.

The decision to follow large areas approach was made in designation process, above all when the habitat types or species are involved in dynamic processes, like river systems or succession stages (pioneer stages, grasslands and natural overgrowing). Thereby we are leaving enough room for natural processes as well as for corresponding human activities (mowing versus abandonment of land use, river flooding and flood control). We believe this approach can to some extent mitigate changes triggered by the climate change.

Leave room to the nature and trust her!

More information for Natura 2000 in Slovenia:

http://www.natura 2000.gov.si

Interactive map:

http://kremen.arso.gov.si/NVatlas/ewmap.asp

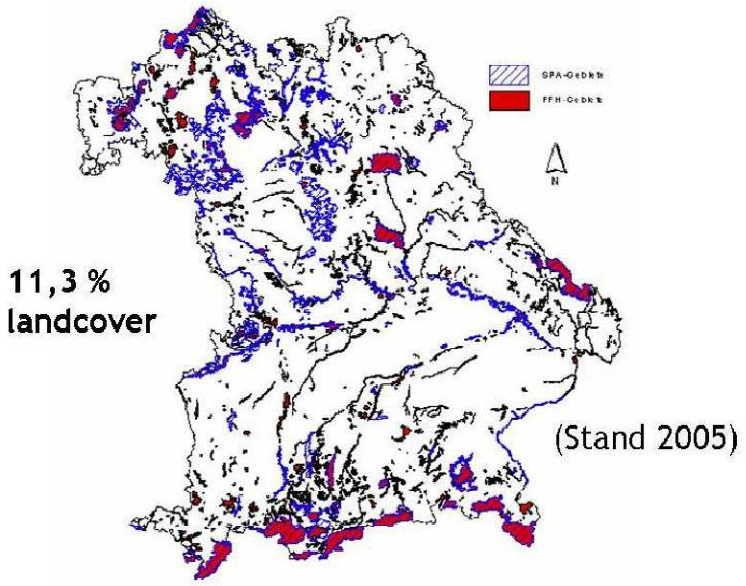
ETC on Biodiversity data:

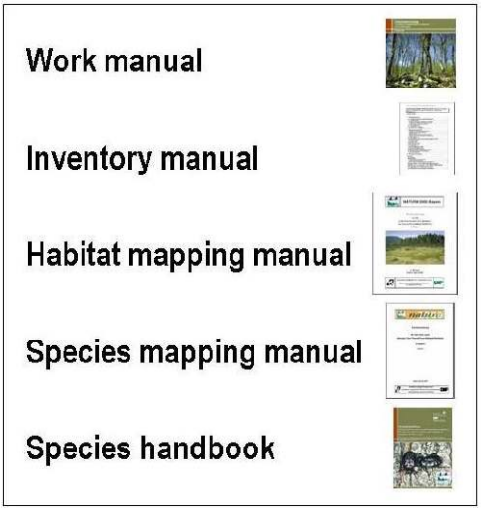
http://biodiversity.eionet.europa.eu/activities/Natura_2000/

Natura 2000 in Bavarian Forests – Assessing the conservation status of forest habitats and species

STEFAN MÜLLER-KROEHLING

Natura 2000 is the most important and largest nature conservation project in Bavaria, covering a total share of 11.3 % of the Bavarian surface area in 744 sites. Some 450.000 hectares or 56% of them are forest, in comparison with only 35% forest share of the land cover. Implementing Natura 2000 is a very important task for the Bavarian forest service and we have been in charge of it since the fall of the year 2000. This includes management according to paragraph 6 of the Directive on Habitats for all forest habitats of Appendix I and all species of Appendices II habitats and Directive on Birds I for forest inhabiting birds.

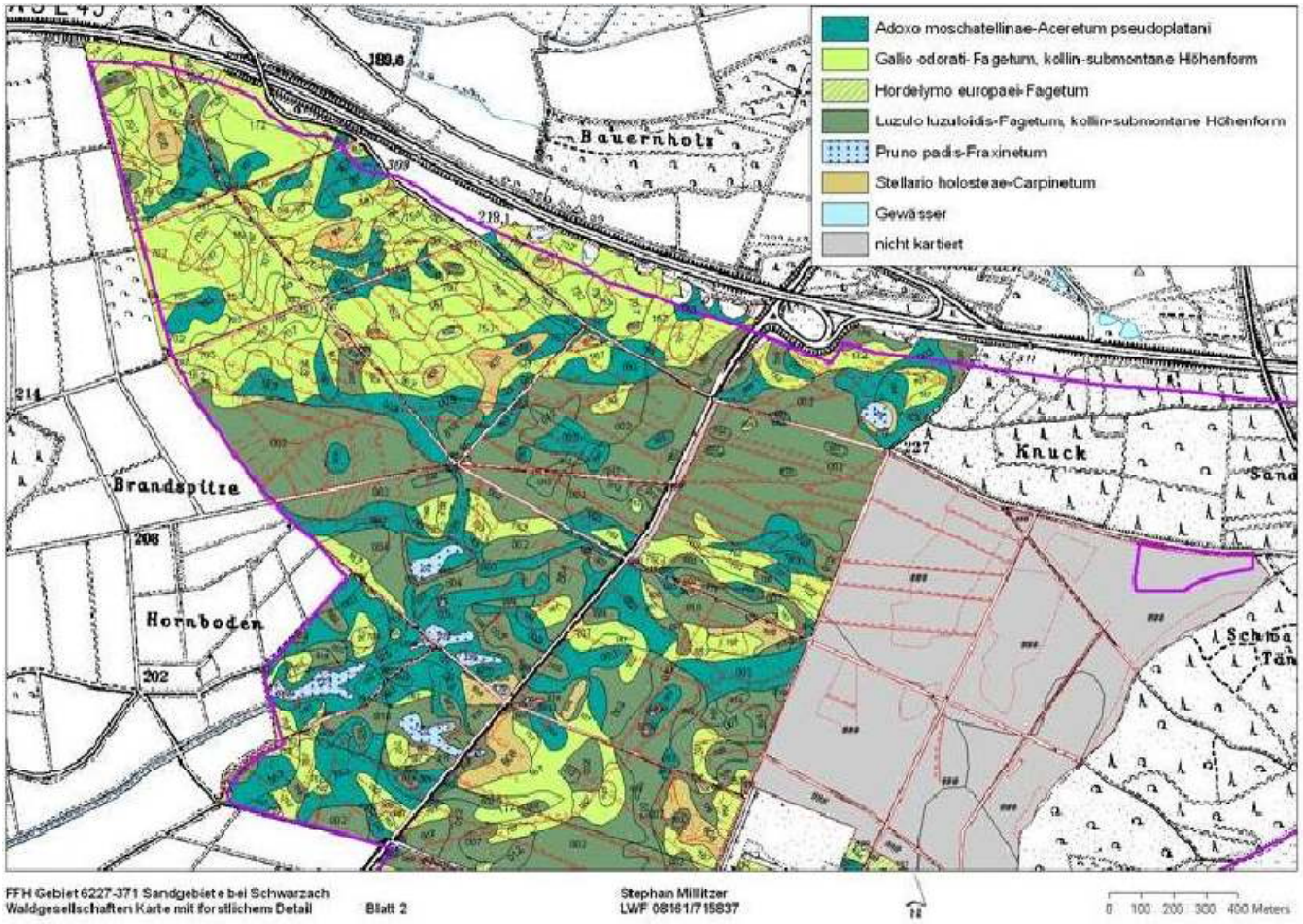




Forestry and the Bavarian Forest Service have a long tradition in forest inventories and a broad understanding of forest ecology. We are well equipped for mapping both habitats and species. Rather little knowledge exists about the whereabouts of habitats and species in Bavarian forests, as mapping them in the forest does not have a long tradition for the most part.

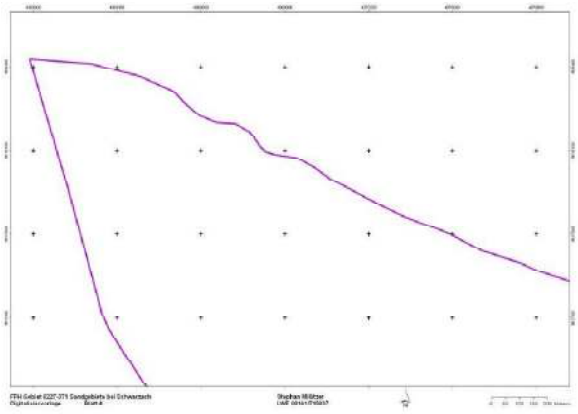
Natura 2000 mapping therefore brings a lot of new results. The mapping of habitats and the inventory work is done by 7 "Regional Mapping Teams", one for each Bavarian regional district. Mapping of species is coordinated by the Bavarian State Institute for Forests and Forestry (LWF) and performed by internal (when available) as well as external experts (on a contract basis). The LWF also prepared all the mapping and inventory guidelines and manuals for

the Natura 2000 field work in forests and can be considered the "think tank" of the Natura 2000 in Bavarian forests.



Potential forest associations derived from a digital site map

All mapping and data gathering tries to utilize as much available cartographic information and data as possible. This is used to model habitats and species' habitats for constructing preliminary maps which have to be validated and improved in the field. Both GIS-modelling and remote sensing are widely used in this field, although they can never replace actual field work.

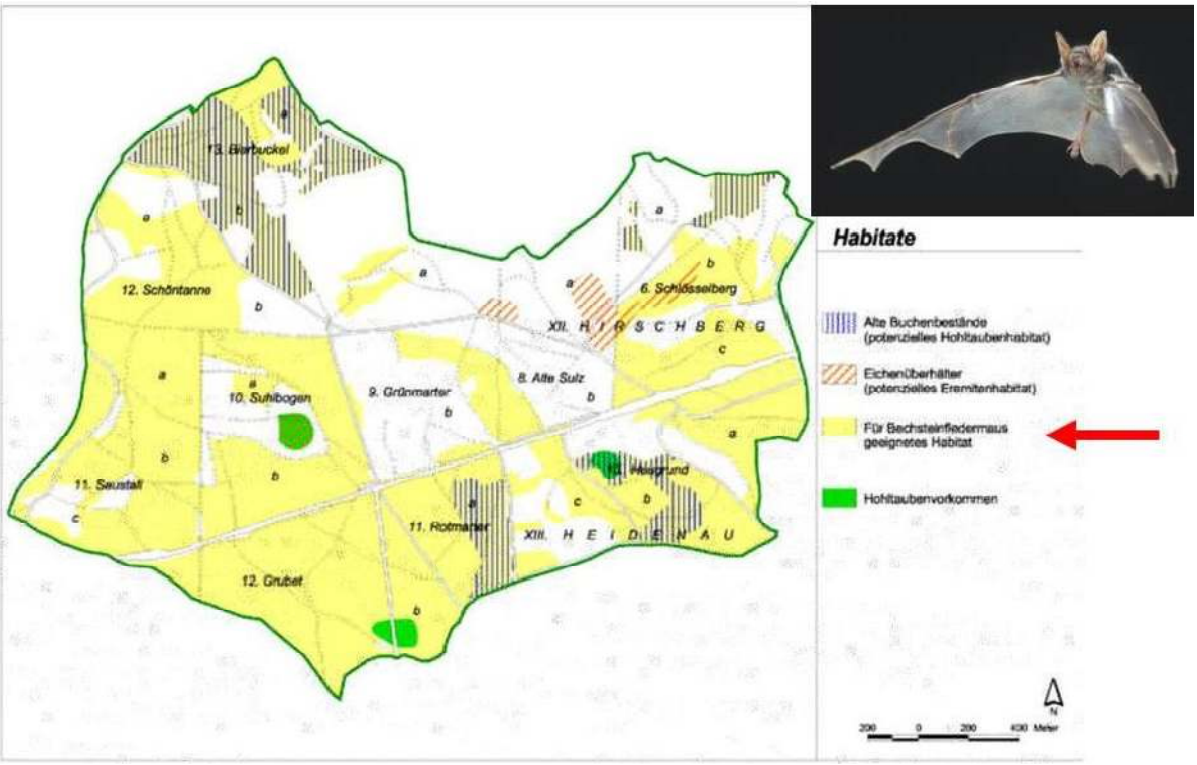


Graph: Inventory grid

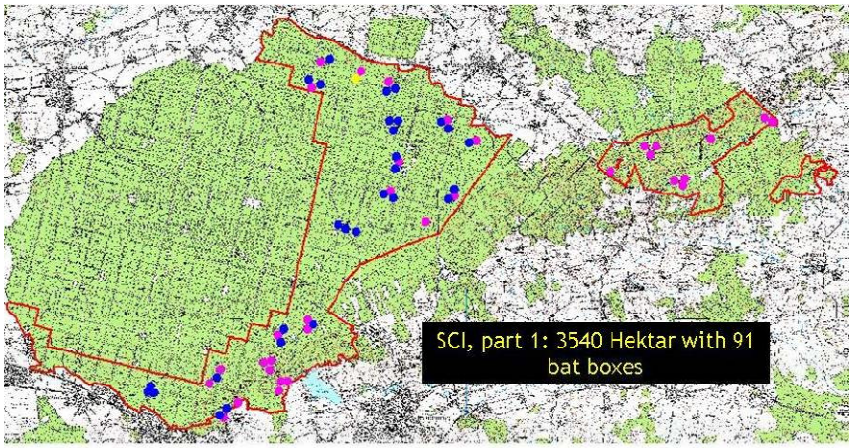
As for the evaluation scale, the use of inventory techniques whenever possible involves evaluation of larger size areas, not those on a forest stand level. However, if a particular forest stand is irreplaceable due to certain qualities like especially old age and its processes, it must be delineated in the measures map.

Criteria used for evaluating "habitat structures and functions" are tree species composition, development phase

structure, layerness, dead wood mass and habitat tree numbers. The "characteristic species" are defined as the completeness of the characteristic tree species both in the stand and in the regeneration layer, as well as characteristic herbs, and for certain habitats also characteristic animal species of high diagnostic value. The third criterion is called "impediments" and includes all kinds of human alterations of the habitat and its functions that impede the "future prospects" listed in the report form.



Appendix II species are evaluated according to "habitat", "population" and "impediments". Appendix species must not be forgotten as they are an equal partner to appendix habitats. Mapping species habitats and populations can be time-consuming and costly but is necessary. However, if data gathering is to be carried out, it must be indispensable for the species and its habitats evaluation and management and not merely for academic purposes.



Größenklassen in ha	< 300	300 – 1000	1000 – 5000	5000 – 10000	> 10000
Anzahl FM-Kästen	40	80	120	160	200

Using bat boxes for mapping population status

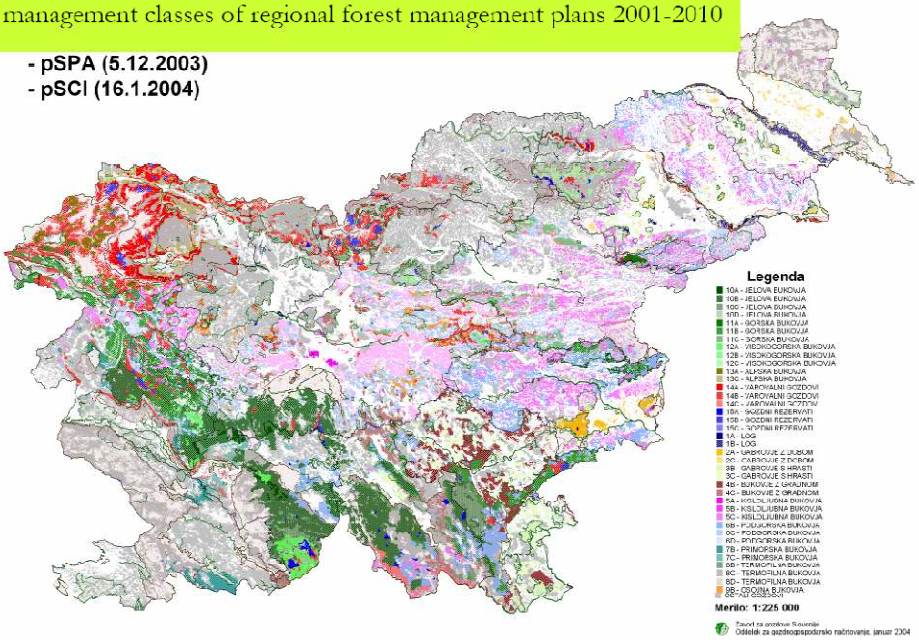
Special kinds of SCIs, like national parks or military training sites, need special solutions. According to the Bavarian Natura 2000 in forests work manual, they are certainly possible, providing they allow for the necessary flexibility and take into account that these particular kinds of SCIs bring other aspects into the Natura 2000 network than "normal" SCIs.

Indicators for conservation status of natural habitat types and habitats of species in Slovenian forests

ALEKSANDER GOLOB

Forests in Slovenia are very important for the conservation of natural habitats and habitats of the species listed in Annexes I and II of the Habitats Directive and in Annex I of the Birds Directive. The Natura 2000 sites represent more than a third of the country's area and it is estimated that approximately a half of all forests are part of these sites. As a consequence of transposition of both EU nature conservation directives into national legislation, the Government issued a decree, which stipulates that surveillance should be implemented within Natura 2000 sites; in this way monitoring the status of plant and animal species and habitat types as well as assessment of effectiveness of conservation measures in terms of achieving favorable conservation status of plant and animal species in question would be provided for.

Potencial areas of forest habitat types in Slovenia according to forest management classes of regional forest management plans 2001-2010



Assessment of conservation level of forest habitat types

Ten Natura 2000 forest habitat types were determined on the basis of forest associations and preservation of the species composition as registered within the databases for forest management planning of the Slovenian Forest Service.

Management class	EU Forest habitat types								
	4070*	9110	9180*	91D0*	91E0*	91K0	91L0	91R0	9530*
Groves					70%		2%		
Hornbeam - pedunculate oak					20%		21%		
Hornbeam with oaks		1%			6%		60%		
Beech - sessile oak		3%				9%	5%		
Acidophylous beech		83%				2%	10%		
Submountainous beech		7%				23%	2%		
Mediterranean beech						3%			
Thermophylous beech						4%		21%	
Shady beech						1%			
Fir - beech			79%			27%			
Mountainous beech			21%			11%			
High mountain beech		5%				2%			
Alpine beech						5%			
Protection forest	89%	1%		48%	3%	10%		78%	50%
Forest reserves	11%			52%	1%	2%		1%	50%
Area (ha)	15930	19844	1869	548	5133	203470	14988	989	791

The level of mapping accuracy requires improvement, especially for the rare and priority types, such as 9180* *Tilio-Acerion* forests of slopes, screes and ravines, 91R0 Dinaric dolomite Scots pine forests (*Genisto januensis-Pinetum*), 91E0*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) and 9530* (Sub-) Mediterranean pine forests with endemic black pines. Mapping problems were well resolved for more common habitat types, such as 91K0 Illyrian beech forests, which are characterized by broad ecological amplitude and an array of forest associations. They are represented within forest management classes comprising forests of similar ecological characteristics whose conservation status can be assessed, monitored and, if appropriate, improved within the forest management planning system.

	Total SI	Prior./ QualSpec	Forest Species	Prior./ QualSpec	D/B%	E/C%
Group	B	C	D	E		
Plants	24	1	7	0	29%	0%
Mosses	4	0	2	0	50%	
Mammals	16	2	6	2	38%	100%
Reptiles	3	1	1	0	33%	0%
Amphibia	5	1	3	0	60%	0%
Fish	30	0	0	0	0%	
Dragonflies	6	0	1	0	17%	
Beetles	15	3	12	2	80%	67%
Buterflies	12	1	5	1	42%	100%
Crabs	2	1	0	0	0%	0%
Moluscs	5	0	0	0	0%	
Birds	112	41	24	17	21%	41%
Total	234	51	61	22	26%	43%
Total terrestrial	202	50	61	22	30%	44%

Identification of forest dependant Natura 2000 species and their ecological requirements

Forest dependant species from the Natura 2000 species list were determined on the basis of available data on their ecological requirements. Although forests cover nearly 70% of Natura 2000 sites in Slovenia, only 30% of all Natura 2000 species were found to be forest dependant. This percentage is much higher for priority species only (44%) and for some taxonomic groups, such as beetles, where it amounts to 80%.

Group	Akx	Aod	Ahd	Agr	Akmp	B	Bzl	Bhd	Brb	Bmkr
Plants						2			5	
Mosses	2									
Mamals					3			3		
Reptiles										1
Amphibia										3
Dragonflies										1
Beetles	1	9	1							1
Buterflies							1		3	1
Birds		2	5	1		1	1	10	4	
Total	3	11	6	1	3	3	2	13	12	7

Legend:

Akmp	Extensive semi-natural forest
Akx	Closed natural forest structures with climax characteristics
Aod	Variegated semi-natural forest structures with lots of dead trees
Ahd	Variegated semi-natural forest structures with habitat trees
Agr	Semi-natural forest with rich bush layer
B	Open forest with larger clearings
Bhd	Open forest with habitat trees
Bzl	Open forest with rich herb layer (composed of specific species)
Brb	Forest with diverse edge
Bmkr	Open forest with wetlands

Important for z

A 24

B 37

Species were classified into species habitat groups according to the structure of the forest they prefer or require. The habitat groups are well correlated with most of taxonomic groups mentioned on the official list, such as beetles, bats, large carnivores, amphibians, higher plants and mosses. The birds as a taxonomic

group however are spread over many habitat groups and should have been examined at more precise and appropriate classification level.

It has been realized that Natura 2000 species are very well chosen to represent various habitat conditions, especially concerning forest structures such as dead wood, habitat trees, and wetlands. An important message for forest management however is that the number of species requiring gaps in canopies and light in the forest is greater than of those requiring darker climax structures.

Most important indicators for monitoring conservation status of forest habitat types and species

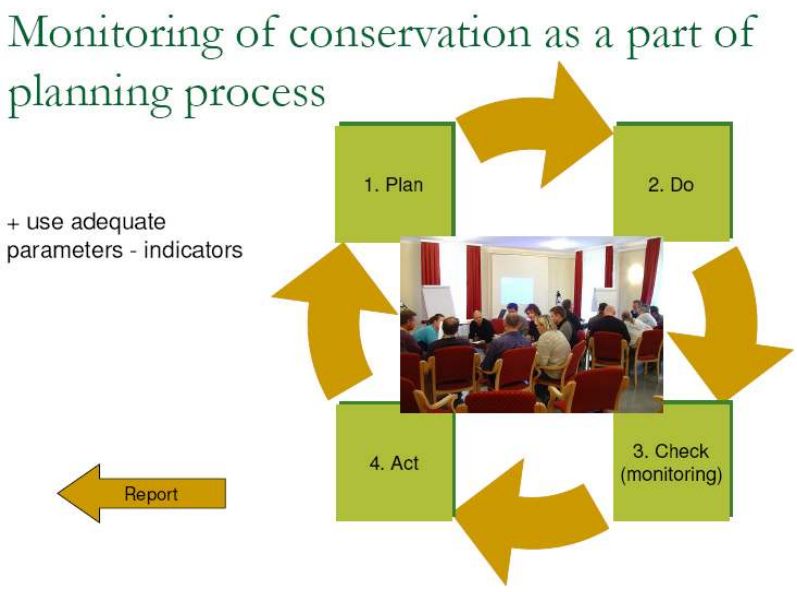
Importance of the above listed indicators for various habitat groups is estimated as follows (compare Mueller-Kroehling):

The most important indicators were found to be:

- area of the habitat,
- tree species composition in growing stock and in regeneration layer,
- horizontal structure and the scale of regeneration areas (phases diversity),
- presence of old growth forests,
- habitat trees,
- dead trees,
- presence of bush and herb layer,
- water bodies,
- quietness/disturbance free periods.

Habitat types and habitats of species	Conservation indicators = planning parameters										
	Area ha	Tree sp.		Phases diversity		OldF	HabT	DeadT	Bush herb	WetL	Peace
		S.	R.	LA	SA						
4070*	***	***									
9180*, 9410	***	***	**	**		*	**	**	*		
91D0*,91E0*	***	**	**	**		*	**	**	*	***	
91R0 9530*	***	***	*	*		*	*	*	*		
9110, 91K0	**	***	**	**			**	**	*		
91L0	**	***	***		**		**	**	*	(***)	
Akmp	***	(**)	*				*	*	**	*	***
Akx	**	**	*	***		***	***	***			
Aod	**	***	*	**		**	**	***		*	***
Ahd	**	***	*	*		**	***	**		**	**
Agr	**	**	*	***		*		*	***	**	***
B	(***)	**	*		***				(**)		**
Bhd	(***)	**	*		**		***			(**)	(***)
Bzl	(***)	(**)			***	(**)		(**)	***		(***)
Brb	(***)	(***)	*		***				(***)	(**)	(***)
Bmkr	(***)	*			***			(**)	*	***	(***)

Monitoring strategy



While reviewing approaches of other EU member states, the Swedish approach elaborated under the term "objectives-based monitoring" (Abenius *et al.* 2004) was noted as very useful, as were the methods for monitoring structure of the forests elaborated by Mueller-Kroehling et al. (2004) and Ruffini (2005).
There are two main principles to follow:
1. Indicators used to set goals are monitoring parameters at the same time.
2. Parameters take into account those factors that can be affected by management or other measures.

Conclusions

1. Taking into account habitat types and all N2K species, a "perfect" conservation status is not possible (e.g. a primeval forest is perfect only for certain species).
2. Favorable conservation status of habitats should be agreed for the defined zones and depends on the species in question. The scale of zoning should be different for different species.
3. If a habitat type encompasses habitats of the N2K forest dependent species, it should be classified favorable regardless the specific management requirements for such species.
4. The zones should be big enough to overcome the problem of developmental phases' dynamics in forests.
5. The two classic indicators for "sustainable" forest management, growing stock and increment, are not sufficient for assessing successful forest management where biodiversity conservation plays an important role. High growing stock does not necessarily mean FCS for many species.
6. Most important additional indicators to the ones used in classic management planning seem to be dead and habitat trees.
7. Dealing with a habitat of species seems to be important for conservation of many species. However, assessment of population density is sometimes a crucial indicator.

Favourable conservation status for selected bird species in the Kočevje Natura 2000 site

MIRKO PERUŠEK

Favourable conservation status of species depends on various ecological (forest community, altitude, gradient, relief, fructification of some tree and shrub species, etc.) and other factors (forestry management classes, forest development phase, growing stock, prescribed increment, hunting management). The following species listed in Annex I of the EU Bird Directive were studied in forests of the Kočevsko-Kolpa Natura 2000 site in this respect: Ural Owl (*Strix uralensis*), Tengmalm's Owl (*Aegolius funereus*), Little Owl (*Glaucidium passerinum*), Hazel Grouse (*Bonasa bonasia*), Black Woodpecker (*Dryocopus martius*), White-backed Woodpecker (*Dendrocopos leucotos*), Three-toed Woodpecker (*Picoides tridactylus*) and Red-breasted Flycatcher (*Ficedula parva*). Owls are secondary tree hole breeders and represent the species near the food chain top. Hazel Grouse is the only ground breeder that feeds on plants, whereas the rest of the species under consideration consume food of animal origin. Woodpeckers are narrow tree specialists, spending most of their lives in forest trees. The largest among them is the Black Woodpecker that makes tall oval nest holes in tree trunks. The Red-breasted Flycatcher is the only representative of the order of passerines. Among the selected species, it is the only migrant, for the rest are sedentary. It nests in tree holes and feeds on insects caught in the air.

The selected birds were studied from 1985 to 2004. Data were obtained by separate observations as well as surveys carried out in the area with the aid of point count, line transect or mapping methods (Bibby, 1992).

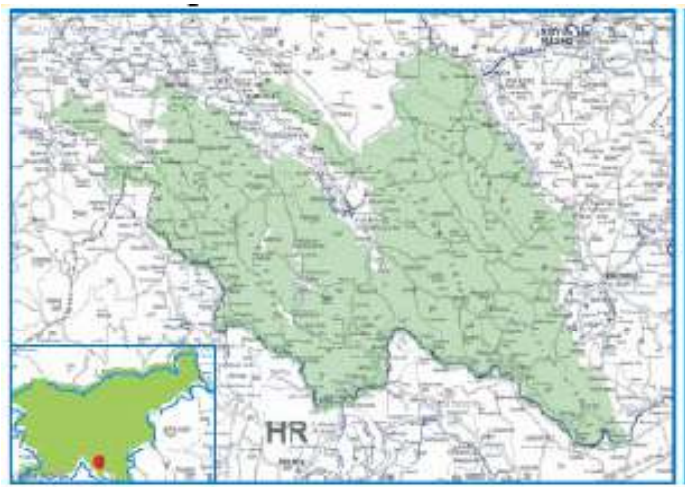


Fig.1 Natura 2000 in Kočevsko area

The Kočevje Forestry Region is situated in the south-western part of Slovenia and covers 117,958 ha, 77.6% of which are overgrown by forests. The geological substratum is composed mainly of limestone and dolomites. Owing to the rapid

exchange of air masses and the impacts of various climatic types, the region is considered part of the interferential climate zone. The long-term average precipitation is 1,381 mm. In the winter, it is usually covered by a thick layer of snow. The greater part of the studied area is situated in karst terrain with its characteristic karst phenomena. It stretches from 1,289 m a.s.l. at Goteniški Snežnik to the lowest point at Dol along the Kolpa river (190 m). The most characteristic mountains are Kočevski Rog, Goteniška gora with Borovška gora, Velika and Mala gora, Stojna and Mačkovec above the Iška river. Most of the expositions are southwesterly, whereas the least are northwesterly. Multi-purpose deciduous forests are predominant in the area. Most common among forest communities are Dinaric fir-beech forests (*Omphalodo-Fagetum*), whose greater part is arranged in the highest forest management class, the uneven-aged fir-beech forest (20.6%). Beech forests spread only on 14.6% of the surface area. A special class are also the forest reserves, with the highest amount of dead trees. In the entire area, standing and lying trees constitute 2.9% of the hectare growing stock. As far as the development phases are concerned, polewood forests and stands of mature trees prevail. Average growing stock is 272 m^3/ha, 47% of which are coniferous trees and 53% deciduous trees. Tree damages are amongst the highest in Slovenia. The virgin forest remains of Krokar and Strmec lie in the Dinaric fir-beech forest.

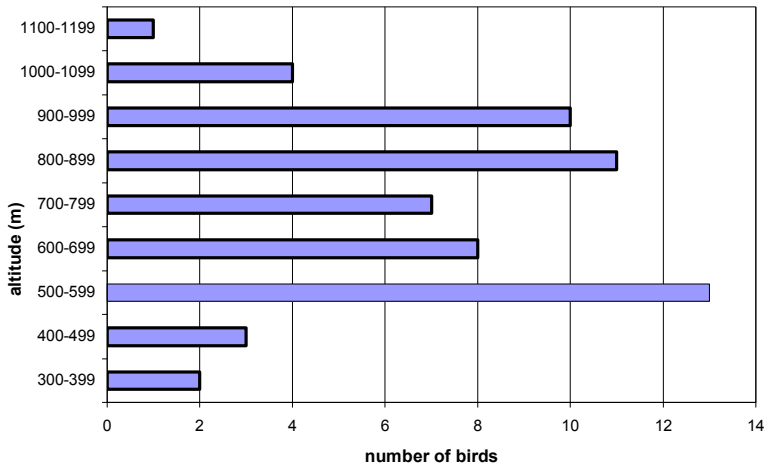


Fig.2 Hazel Grouse altitudional distribution

For each species, the number of observations per separate months was ascertained. The selected bird species were observed most often in April and May, and in the years of 1993 and 2002, as far as the entire study period is concerned. Their altitudinal distribution was also established and, for the Ural Owl, the altitudinal distribution during its breeding and non-breeding periods. The selected species mostly reside at higher altitudes, for this is by 152 m (18.7%) higher than the average of the Kočevje departments. The highest altitude habitats are favoured by the White-backed Woodpecker and Red-breasted Flycatcher. The terrain's gradient is the greatest in the Black Woodpecker's habitat (26.8%), the smallest in the Red-breasted Flycatcher's habitat (12.1%). The observed species mostly select northern and southwestern expositions. The stoniest areas are frequented by the Three-toed Woodpecker (32.7% stoniness). Characteristic of these areas is a high number of drying firs. The least stony habitats are home to Tengmalm's Owl (10% stoniness). In the area where the selected birds were observed, the sub-community *Abieti-Fagetum omphalodetosum* predominates, which happens to be the best represented sub-community in the area.

The best represented in the forestry management class of *Abieti-Fagetum omphalodetosum* with collectively progressive management are the Ural Owl, Tengmalm's Owl and Hazel Grouse, in the class *Abieti-Fagetum clematidetosum* it is the Black Woodpecker that is represented best, whereas in the forest reserve class these are the species with narrow ecological niches, i.e. the White-backed Woodpecker, Three-toed Woodpecker and Red-breasted Flycatcher. In the class *Abieti-Fagetum typicum*, Tengmalm's Owls and Little Owls were most often observed. Prevalent among forest development phases are the mature phases, i.e. stands of mature and

rejuvenated trees. The most mosaic-like forest structures are frequented by the Black Woodpecker. The greatest variegation of young forest is found in the Hazel Grouse's habitat. The Red-breasted Flycatcher resides in the stands with the highest growing stock (median 649 m^3/ha), whereas Tengmalm's Owl inhabits stands with the lowest growing stock (median 315 m^3/ha). The greatest growing stock deviation was recorded in the White-backed Woodpecker's habitat. The Red-breasted Flycatcher's and White-backed Woodpecker's habitats have the highest share of deciduous trees in the growing stock, while the Little Owl's and Tengmalm's Owl's habitats have the highest share of coniferous trees. The narrowest ecological niche belongs to the Red-breasted Flycatcher, the widest to the Ural Owl. Among owls, the narrowest niche belongs to Tengmalm's Owl, and among woodpeckers to the White-backed Woodpecker. The owls' niches overlap each other fairly well, the woodpeckers' to a much lesser extent. The greatest niche overlap was established between the Ural Owl and Hazel Grouse, the smallest between the Black Woodpecker and White-backed Woodpecker. The last two species have very different ecological demands, in spite of the fact that both have their habitats on tree trunks and in them.

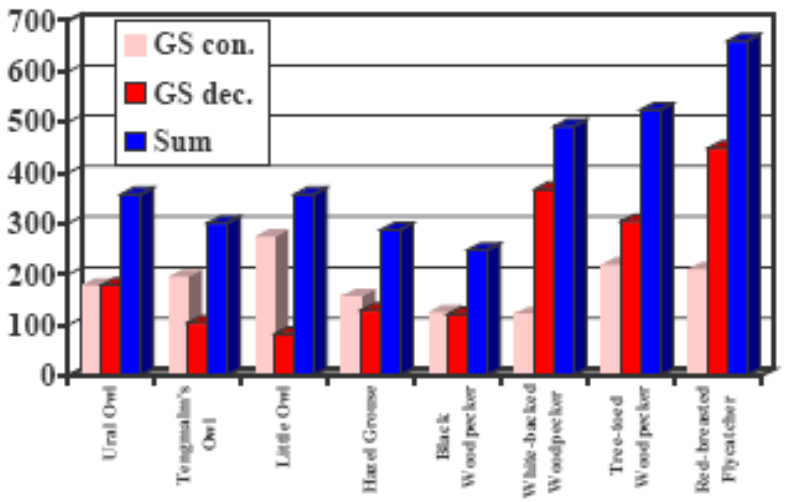


Fig.3 Average growing stock (GS) per hectare (m^3/ha) in forestry departments where the selected birds were observed

Forestry and hunting measures have usually a quite distinct effect on ground breeders, such as the Hazel Grouse. Rigours of the weather and excessive reproduction of insects have, in the short run, a positive effect on woodpeckers and partially owls as well. The ample growing stocks suit the majority of the dealt with species. There is a strong effect of forest communities and forestry management classes on the narrowly specialised bird species (White-backed Woodpecker, Three-toed Woodpecker and Red-breasted Flycatcher). Quite explicit in forest owl species are the interspecific relations – particularly predation and thus withdrawal of smaller owl species from the areas inhabited by larger owls. The Ural Owl, as the largest one, selects the best habitats, whereas smaller owl species select mostly coniferous forests, i.e. those not inhabited by the bigger owls.

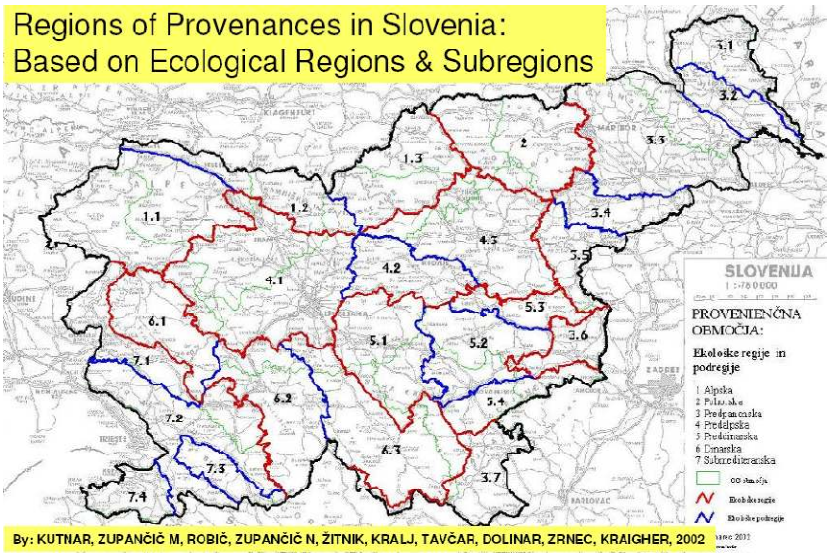
Fig. 4: Ural Owl selects the best habitats

Indicators and approaches in conservation of forest genetic resources

HOJKA KRAIGHER, GREGOR BOŽIČ, MARJANA PUČKO, ANDREJA FERREIRA

Legal basis for conservation of FGR is provided through international (ratified) documents (CBD, MCPFE, EU programmes and strategies and CAPs), the Forest Act 1993, Forest Development Programme of Slovenia (FDP) 1996 & hopefully the new NFP in Slovenia, the Act on Conservation of Nature 1999; the Biological and Landscape Diversity in Slovenia – An overview 2001 and the Biodiversity Conservation Strategy of Slovenia (BCS) 2001/2002, the latter citing 14 most important directions from the FDP (1996) and adding a single new directive: 'To establish, within the framework of the Slovenian forest gene bank, a network of forest gene reserves based on expert criteria and on appropriate characterisation of and documentation on indigenous populations of forest genetic resources.'

Genetic diversity (GD) is a variation among various copies of related genes present in different individuals or different species of organisms. It consists of differences between individuals and species in the presence of particular DNA sequences or their location in the genome; its building blocks include diversity encoded by specific genes that some organisms possess but others lack, differences in sequences that regulate gene expression, differences in other non-coding sequences, differences arising from differing copies of homologous or related DNA sequences (i.e.allelic variation), diversity due to translocation of a sequence from one chromosomal site to another. Levels and patterns of GD are the result of both evolutionary and ecological processes & as such reflect the integrity and functioning of evolutionary and ecosystem processes within species. Five main interacting evolutionary processes affect the amount and distribution of GD: mutation, selection, random genetic drift, migration, mating and genetic recombination.



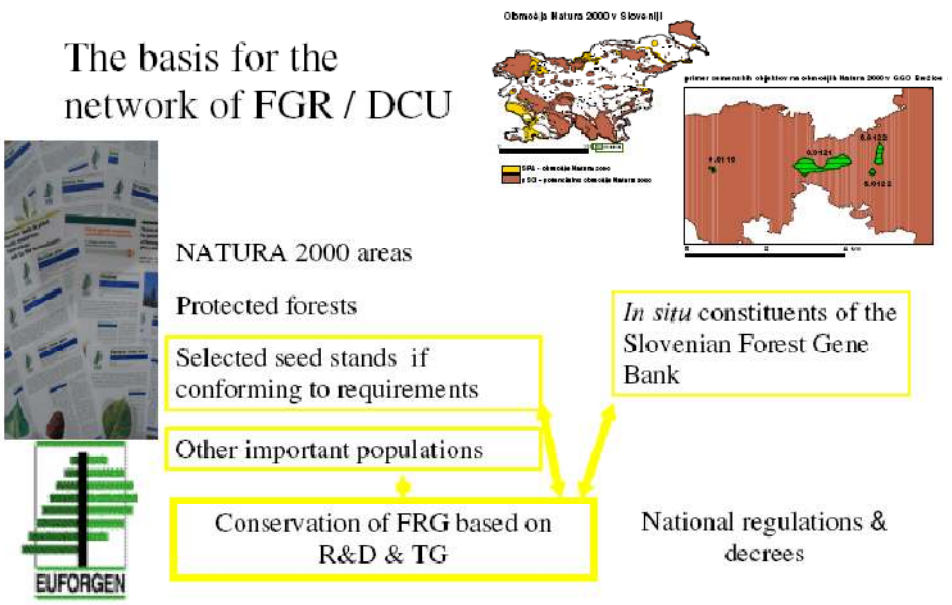
The importance of GD is in safeguarding the potential for adaptation:

Adaptedness = the degree to which an organism is able to live and reproduce in a given environment.

Dynamic conservation implies prevention of drastic alterations in the pace and direction of these evolutionary processes.

Indicators for conservation of FGR: i) No. of sub-specific taxa; ii) Population size, number and physical isolation; iii) Environmental amplitude of populations; iv) Genetic diversity at marker loci within individuals and populations; v) Quantitative genetic variation; vi) Inter-population genetic structure; vii) Mating; viii) Population turnover; ix) Fluctuating asymmetry of phenotypic characteristics. The interpretation of indicators across time, their significance, reference points and possible conflicting results needs to be considered.

Requirements depend on biology of the species: i) Population effective size: number and area(s), gender and developmental phase distribution; ii) Origin and isolation; iii) Adaptation to environmental conditions; iv) Possibilities (property, landscape planning) for long-term dynamic conservation through use – formulation of a management plan for each conservation stand; v) Norway spruce (Koski 1996): secure, land tenure, local origin, >100 ha, min diameter 400 m, or as special 'gene rescuing case'; vi)Noble hardwoods (Euforgen): possible distribution in groups, distance depending on reproductive biology, detectable inbreeding and hybridization processes, can be complemented with the *ex situ* conservation and use of FRM; whenever possible, *in situ* conservation of several species through complementary management plans.



Minimum sample size for sampling genetic marker distribution is based on Gregorius (1980) based formulas for the detection probability for a sample of a given size, from which the practical directives for collection of forest reproductive material from at least 50 seed trees have been proposed. Adaptation to ecological conditions (applied also in low-cost approaches of monitoring of GD) is a prerequisite for delineation of Dynamic Conservation Units (DCU). The criteria are considered relative compared to the characteristics of the basic material in evaluation with respect to all other forest stands in the region. These criteria are based on the long term capability of the stand to survive in its environment, shown in generative (flowering, fructification) or vegetative reproduction, survival of natural regeneration, adaptation to climate conditions, capability to regenerate after stress, adaptation to the water regime and soil conditions, competitiveness in the plant community, tree vitality, adaptation to other stressful environmental conditions.

Research is needed for illuminating linkages between different indicator groups (i.e. population size per gen. variation in a tax. group); understanding how different groups of organisms are historically structured (connected or fragmented) and how various pressures affect these functional groups; providing baseline data on genetic diversity for groups of species for which information is currently missing (fungi & bacteria in general, forest tree species in Slovenia).

Virgin forests of the Kočevje region

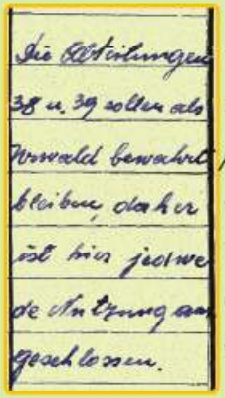
TOMAŽ HARTMAN

Tomaž Hartman dedicated his professional career to virgin forests in the Kočevje region. His findings are presented in the posters below, which are set up in nature for the visitors.

VIRGIN FORESTS OF THE KOČEVJE REGION

100 YEARS OF VIRGIN FORESTS' CONSERVATION IN SLOVENIA

Only a century ago, the vast tablelands of Kočevsko: Rog, Stojna and Goteniška gora were still inaccessible virgin forests. Thanks to Count Auersperg's wisdom and ecological awareness of the forester Dr. Leopold Hufnagel the majestic fir and beech forests, the kingdom of bear, wolf, lynx and eagle were preserved to this very day. What's more, the wise forester was among the first in Europe to hand over the precious natural heritage - virgin forest - to us with the following brief annotation in the forest management plan:



Compartments 38 a. 39 are to be preserved as a virgin forests. Any use of them is therefore excluded.

The famous "protective" remark is written down in the first forest management plan of Kočevsko:

Herzogtum Gottschee
Wirtschaftsplan der Betriebsklasse I.
GÖTTENITZER GEBIRGE
Giltig vom 1. Janner 1892

Virgin forest reserves form a protected natural heritage where no living trees are felled and no dead trees taken away, where mushrooms and flowers are not gathered and where the silence is not disturbed. We simply surrender to nature.

Forest reserves are marked with blue colour and it is possible to walk only to the edge of the virgin forest on marked

A virgin forest - a touch of prehistorical times, inner peace or just the sirgularity of majestic rotting trees - enchants us over and over again. Rare and fragile, but all the more precious for that, the intact nature is above all a natural monument and a heritage, cherished with due respect.

A virgin forest - a forest never touched by axe. Undisturbed, the laws of nature have ruled primeval forests for millenia. In the eternal cycle of births and deaths life is linked up into a healthy and firm system. There is no good or evil, nor useful or harmful here. Everything that exists in a virgin forest is subject to slow but continuous and safe renewal.

Today, a virgin forest is a unique research workshop. An ecosystem which has been evolving over millenia all by itself, certainly deserves to be imitated. Primeval nature keeps ancient but verified information on stability, safety, as well as harmony of survival.

The majesty of virgin forests is in their giant trees growing to the height of 50 metres, measuring over 1.5 metres in diameter, carrying up to 50 tons of wood mass and living to the age of 500 years and more.

Nature in a virgin forest prepares for all "unpredictable events" with the precision characteristic of the evolutionary process, but human influence, in the form of air pollution, acid rain and excessive wildlife, has an ever more critical effect, and the selfsufficiency and permanence of one of nature's strongest forms is today seriously threatened.

There are 14 virgin forests in Slovenia, **6** of them measuring **218** hectares altogether in the Kočevje region.

Borovška gora with its picturesque precipitous walls above the Kolpe river hides the little known **virgin forest Krokar**. The rolling karst plateau is mostly covered with beech forests.

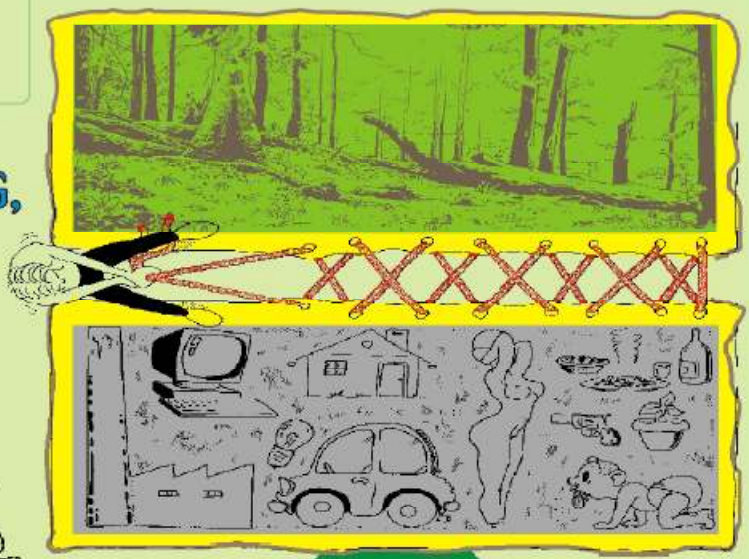
The **virgin forest Strmec** lies on the southern slope of Stojna. The abundance of maple and spruce trees makes the virgin forest fragment of fir and beech wood especially picturesque.

Because of temperature inversion and frosty bottom, the famous karst sink at the foothills of Rog, called **Prelesnikova koliševka**, boasts a primeval spruce forest and rich flora which would otherwise be found in a cold mountain climate or far to the north.

Stretching over a smaller surface, there is a primeval dinaric beech-maple forest, called the **Kopa virgin forest**, on the eastern slope of the summit Kopa in Rog.

The **Pečka** and **Rajhenavski Rog virgin forests** are magnificient fortresses of fir and beech trees. They are also the best explored forest reserves in Rog.

WE ARE TRYING, AREN'T WE !?

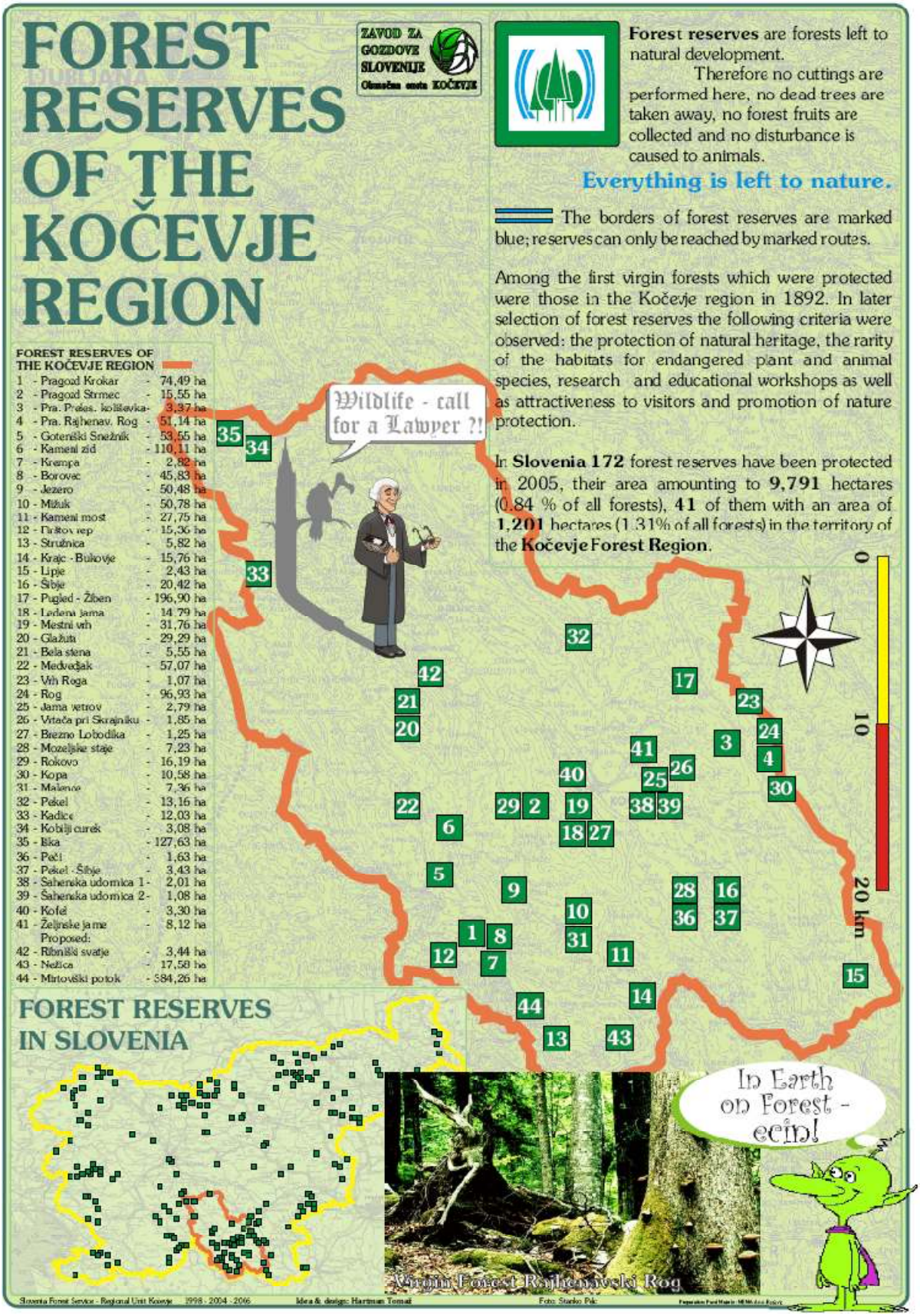


Kočevsko virgin forests:

1	Krokar	:74.49 ha
2	Strmec	:15.55 ha
3	Preles. koliševka	: 3.37 ha
4	Kopa	:14.05 ha
5	Pečka	:60.20 ha
6	Rajhenavski Rog	:51.14 ha

ZAVOD ZA GOZDOVE SLOVENIJE
Območna enota KOČEVJE

Zavod za gozdove Slovenije - Območna enota Kočevje 1998 - 2006 Idea & Design: Hartman Tomaž Drawing: Robert Kobar


FOREST RESERVES OF THE KOČEVJE REGION
ZAVOD ZA GOZDOVE SLOVENIJE
Območna enota KOČEVJE
Forest reserves are forests left to natural development.
Therefore no cuttings are performed here, no dead trees are taken away, no forest fruits are collected and no disturbance is caused to animals.
Everything is left to nature.
The borders of forest reserves are marked blue; reserves can only be reached by marked routes.
Among the first virgin forests which were protected were those in the Kočevje region in 1892. In later selection of forest reserves the following criteria were observed: the protection of natural heritage, the rarity of the habitats for endangered plant and animal species, research and educational workshops as well as attractiveness to visitors and promotion of nature protection.
In Slovenia 172 forest reserves have been protected in 2005, their area amounting to 9,791 hectares (0.84 % of all forests), 41 of them with an area of 1,201 hectares (1.31% of all forests) in the territory of the Kočevje Forest Region.
FOREST RESERVES OF THE KOČEVJE REGION
1 - Pragozd Krokar - 74,49 ha
2 - Pragozd Strmec - 15,55 ha
3 - Pra. Preles. kolišćvika- 3,37 ha
4 - Pra. Rajhenav. Rog - 51,14 ha
5 - Goteniški Snežnik - 53,55 ha
6 - Kameni zid - 110,11 ha
7 - Krempa - 2,82 ha
8 - Borovec - 45,83 ha
9 - Jezero - 50,48 ha
10 - Mlčuk - 50,78 ha
11 - Kameni most - 27,75 ha
12 - Travnik rep - 15,36 ha
13 - Stružnica - 5,82 ha
14 - Krajc - Bukovje - 15,76 ha
15 - Lipje - 2,43 ha
16 - Šibje - 20,42 ha
17 - Pugled - Žiben - 196,90 ha
18 - Ledena jama - 14,79 ha
19 - Mestni vrh - 31,76 ha
20 - Glažuta - 29,29 ha
21 - Bela stena - 5,55 ha
22 - Medvedjak - 57,07 ha
23 - Vrh Roga - 1,07 ha
24 - Rog - 96,93 ha
25 - Jama vetrov - 2,79 ha
26 - Vrtača pri Skrajniku - 1,85 ha
27 - Brezno Lobodika - 1,25 ha
28 - Mozeljske staje - 7,23 ha
29 - Rokovo - 16,19 ha
30 - Kopa - 10,58 ha
31 - Malenco - 7,36 ha
32 - Pekel - 13,16 ha
33 - Kadice - 12,03 ha
34 - Kobiji curek - 3,08 ha
35 - Iška - 127,63 ha
36 - Peči - 1,63 ha
37 - Pekel - Šibje - 3,43 ha
38 - Šahenska udornica 1 - 2,01 ha
39 - Šahenska udornica 2 - 1,08 ha
40 - Kofel - 3,30 ha
41 - Željnske jame - 8,12 ha
Proposed:
42 - Ribniški svatje - 3,44 ha
43 - Nežica - 17,58 ha
44 - Mirtovški potok - 584,26 ha
Wildlife - call for a Lawyer ?!
N
0
10
20 km
FOREST RESERVES IN SLOVENIA
In Earth on Forest - ecin!
Virgin Forest Rajhenavski Rog
Slovenia Forest Service - Regional Unit Kocevje 1998 - 2004 - 2006
Idea & design: Hartman Tomat
Foto: Stanko Pik

VIRGIN FOREST STRMEC

Forest reserves form a protected natural heritage where no living trees are felled and no dead trees taken away, where mushrooms and flowers are not gathered and where the silence is not disturbed. **We simply surrender to nature.**

Forest reserves are marked with blue colour and it is possible to walk only to the edge of the virgin forest on marked paths.

Legend:

- forest road
- forest reserve
- info table
- cave Eleonorina jama

Position: west rocky slope on Stojna mountain, 840-950 m a.s.l.
Area: 15.55 hectares
Parent rock: limestone
Forest vegetation type: Abieti-Fagetum din.
Stand: primeval stands of prevailing **beech** (Fagus sylvatica) - 63% of wood mass and **fir** (Abies alba) - 25% with some trees of **spruce** (Picea abies) - 6%, **maple** (Acer pseudoplatanus) - 4%, and few trees of **elm** (Ulmus glabra), Ostrya, Tilia...

Developmental phases:

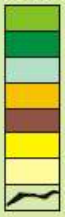
Despite monolithic appearance, a virgin forest is highly variegated. Three stages of development are interwoven in small areas: regeneration, mature and ageing phases.

Optimal phase: The majority of trees always belong to the full or optimum growth stage, which guarantees security and stability to the forest.

Initial phase: Trees in the virgin forest die individually, and beech shoots immediately fill the gaps. Slender firs grow among the young beeches, endure well in the shade. The waiting, which can last a century and seems to man extremely long, represents a constituent part of life for a fir, perhaps a condition for it to grow into a giant tree.

Terminal phase: The role of dead trees in a virgin forest is quite special. A new microcosm, a home and rich table for numerous micro-organism, fungi, birds, which represent an important part of ecosystem emerges in slowly decaying stems. A dead fir tree becomes more alive than it used to be when it was still a vital green tree.

Developmental phases 2000:

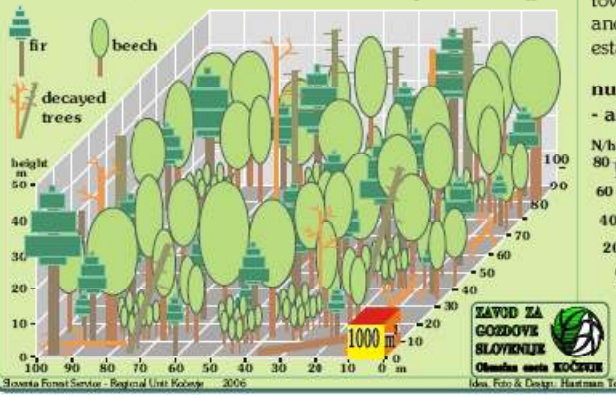


- 81,2 % optimal
- 2,2 % optimal with regeneration
- 1,0 % selective
- 0,5 % over mature
- 3,4 % over mature - decaying
- 2,1 % initial with shelter
- 9,6 % initial without shelter
- diffs

The enormous quantity of wood is unquestionably the main weapon of the fir and beech forest in its fight for survival. It represents the framework, the storage of energy, which in this rocky karstic terrain can preserve the fertile soil and water, still the winds and cool the air.

As to their heights, the stands are pretty uniform, of much the same height yet not even-aged. The stand canopy is formed by a mass of beech trees of 30-35 metres, from which individual firs protrude, exceeding the beech by 10 metres.

Timber mass, number of trees and developmental stages:

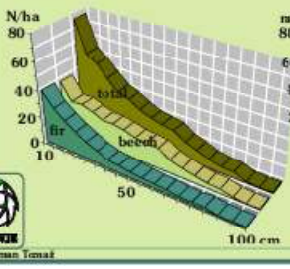


Data 2004: In the total area - **15.55** hectares - there are 8,507 alive and dead trees up of 10 cm in diameter.
Total wood mass - alive and dead - is 14,615 m³.

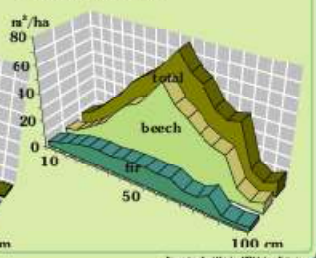
per 1 hectare	fir+spruce		beech+o.d.t.		total		
	alive	dead	alive	dead	alive	dead	**total**
number N/ha	156	118	244	29	400	147	**547**
mass m³/ha	167	207	504	62	671	269	**940**

The forest environment in the virgin forest Strmec is dominated by towering trees. Firs can reach 150cm in diameter, 50m in height and 500 years! It is possible that up to 2000 tons of biomass can be established in one hectare of the virgin forest.

number of trees - alive - 2004



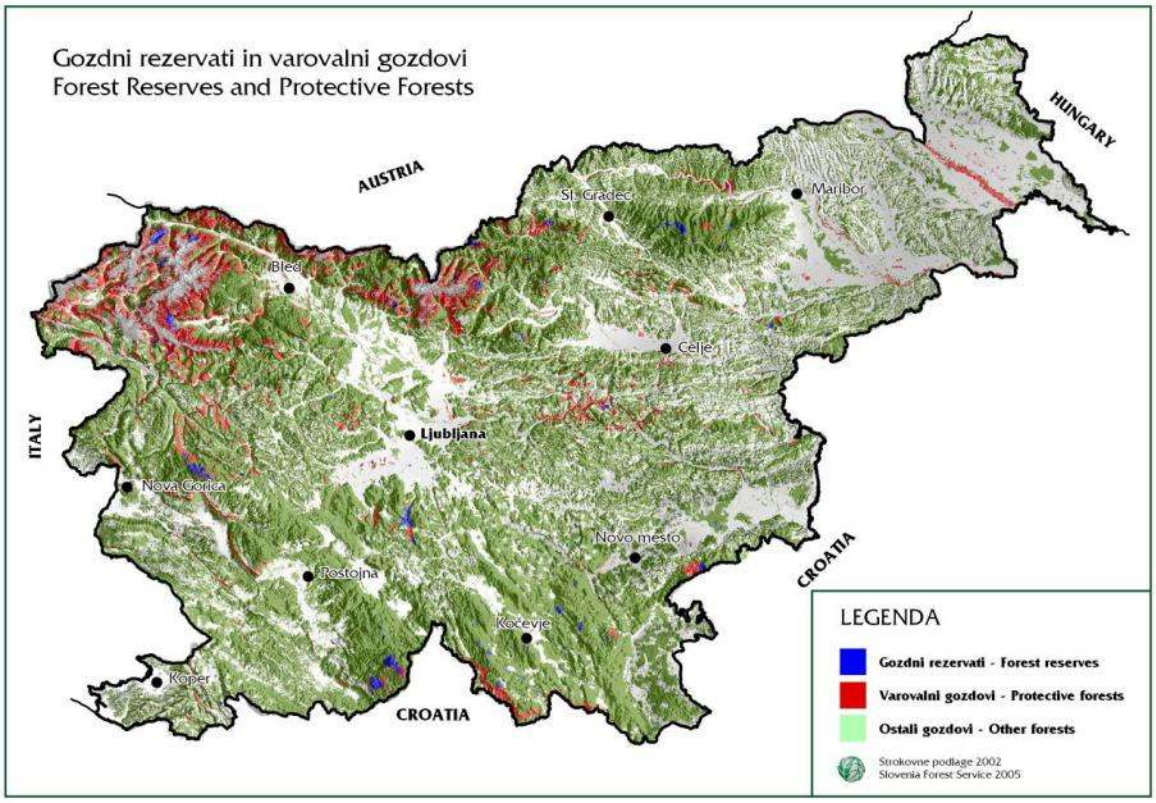
timber mass - alive - 2004



Structural characteristics and monitoring of forest stands in the primeval forest Krokar

ROK PISEK

Legal basis for conservation of FGR is provided through international (ratified) documents (CBD, MCPFE, EU programmes and strategies and CAPs), the Forest Act 1993, Forest Development Programme of Slovenia (FDP) 1996 & hopefully the new NFP in Slovenia, the Act on Conservation of Nature 1999; the Biological and Landscape Diversity in Slovenia – An overview 2001 and the Biodiversity Conservation Strategy of Slovenia (BCS) 2001/2002, the latter citing 14 most important directions from the FDP (1996) and adding a single new directive: 'To establish, within the framework of the Slovenian forest gene bank, a network of forest gene reserves based on expert criteria and on appropriate characterisation of and documentation on indigenous populations of forest genetic resources.'



Regarding the share, approximately 10% of protected areas and 1% of strict forest reserves place Slovenia among the average European countries, however, the comparison is very difficult due to the broad range of the protected areas in European Union.

The majority of Slovenian protection forests are situated in the northwestern Slovenia, in the mountain part of Julian Alps, but they represent an important category also on many other sites. Forest reserves are much less frequent, but they are more evenly distributed.

It is important to know both the structure and the development of forest reserves, as this information can be used in the field of the close-to-nature management in multi-use forests. The existing methodology of forest development monitoring in reserves should be enhanced in such a way that the data will form a basis for long-term studies, preservation of nature and comparison with the structure of the multi-use close-to-nature forests. Thereby it is especially important to study the effect of structural stand characteristics of forest reserves on monitoring method.

The monitoring method was tested on the example of the Krokar primeval forest, situated in the utmost southern part of Slovenia in the dinaric region, in the Kočevje forest-management region in the altitude about 1000m. It is surrounded by the Borovec forest reserve representing the buffer zone. The bedrock consists of limestone and dolomite, on the basis of which rendzina developed. The average quantity of precipitations amounts to 1.500 mm per year (period 1991-2000, measuring station Kočevje).

Beech is the main tree species. This is also indicated by the present forest associations (beeches: Arunco Fagetum, Enneaphylo Fagetum, Isopryo Fagetum and fir - beech forest type with some subassociations).

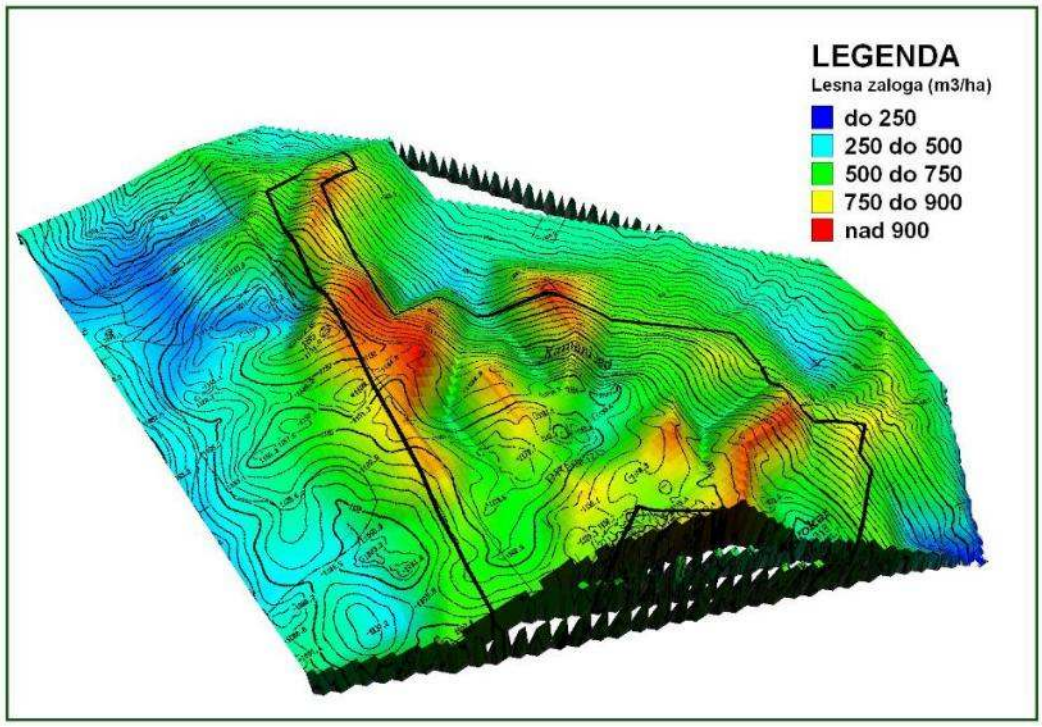
In the past decades, in the Krokar primeval forest numerous studies were performed. They treated individual viewpoints of primeval forest and its development. These activities did not enable us successful monitoring of the primeval forest development. The only long-lasting periodical measurements were full surveys in ten-year cycles accompanying renewals of forest management plans. Such surveys require intense work, but they yield relatively few useful data for monitoring the primeval forest dynamics.

Table 1: Results of measurements of the Krokar primeval forest full survey in the year 2004

Parameter	**Value**	**Share (%)**
Forest area	74,49 ha	
Growing stock	635 m^3/ha	
• Coniferous	47 m^3/ha	8
• Broadleaf	588 m^3/ha	92
Dead wood biomass	154 m^3/ha	
• Standing	66 m^3/ha	43
• Lying	88 m^3/ha	57
Number of trees	373 trees/ha	
• Coniferous	41 trees/ha	11
• Broadleaf	332 trees/ha	89
Number of tree species	18	

As the Table 1 shows, the growing stock in the Krokar primeval forest is very high and its level has been stable in the recent decades. Forming 90% of the growing stock, the broadleaf species prevail. The dead biomass represents 20% of all biomass in this primeval forest. The indicated data represent a part of the full

survey repeated for the fifth time in the last 110 years. All trees with the breast diameter over 5 cm and also all dead standing and lying biomass over this threshold were measured.
At the same time, a net of permanent sample plots with raster of 125x125 m was established in the object. It corresponds to the net of the surrounding managed forest with the raster of 250x250 m. Such net has 46 permanent sample plots where the same parameters as in the managed forest were measured. The most important among them are: tree species, breast diameter, height (in some places), tree quality, damage, situation (polar coordinates), distance to the center and social situation. Picture 2 shows 3D map of growing stock of the studied object. The results of the measurements on the permanent sample plots can form a very good basis for a series of analyses.



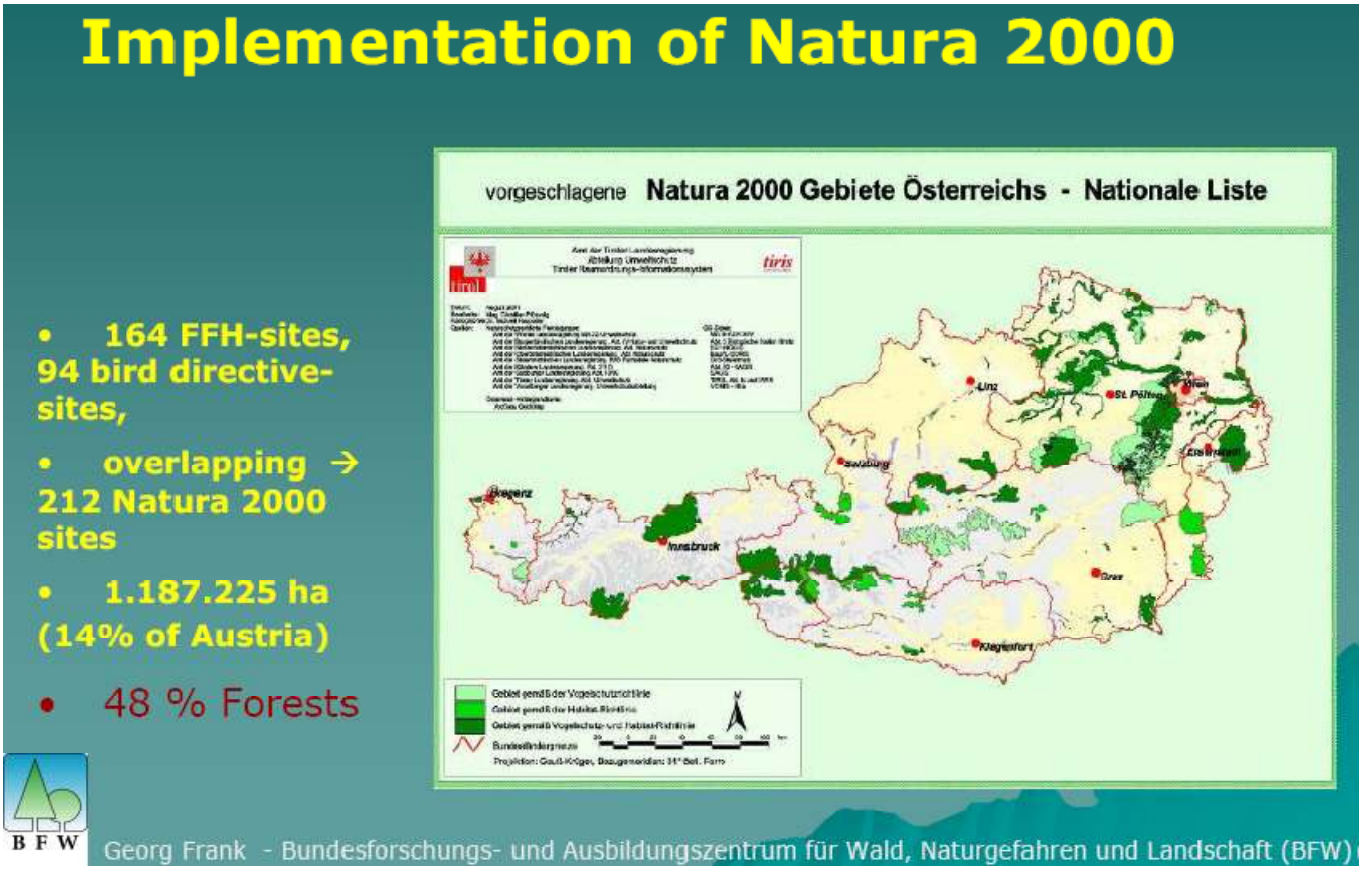
Picture 2: 3D map of growing stock distribution in the Krokar primeval forest (source: measurements on the constant sample planes, 2004)

This is only the first part of our task. Our main objective is to find the most appropriate approach or combination of existing methods, the most suitable for monitoring the condition and development in diverse forest reserves, on the basis of these results, international studies and recommendations. Thereby we have to consider their size, homogeny and some other specialties. Achieving this objective will contribute to the development of an acceptable and economically justified method or combination of chosen methods. On the basis of the long-term condition monitoring, such improved and useful method of Slovenian forest reserve monitoring will yield important information on condition and development of the chosen forest ecosystems. At the same time, we will also gain new knowledge we could use to direct the economizing in the economy forests.

Forest management in Natura 2000 sites in Austria

GEORG FRANK

In Austria, forestry and forest management are within the competence of the Federal Government, legal requirements are covered by the Forest Act. By way of contrast, the nine Federal Provinces have legal authority regarding legislation and implementation of provisions in the field of nature and landscape protection. Hence, Austria does not have one Federal law on the protection or conservation of nature but nine provincial jurisdictions. Legally the Federal Government is not responsible for the protection of nature, with the exceptions of international agreements, relevant European Commission Programmes, and supporting the provinces in the establishment and management of National Parks. This separation of the responsibilities between the Federal Government (forestry) and the nine Provincial Governments (nature protection) sometimes makes it difficult to find common ground.

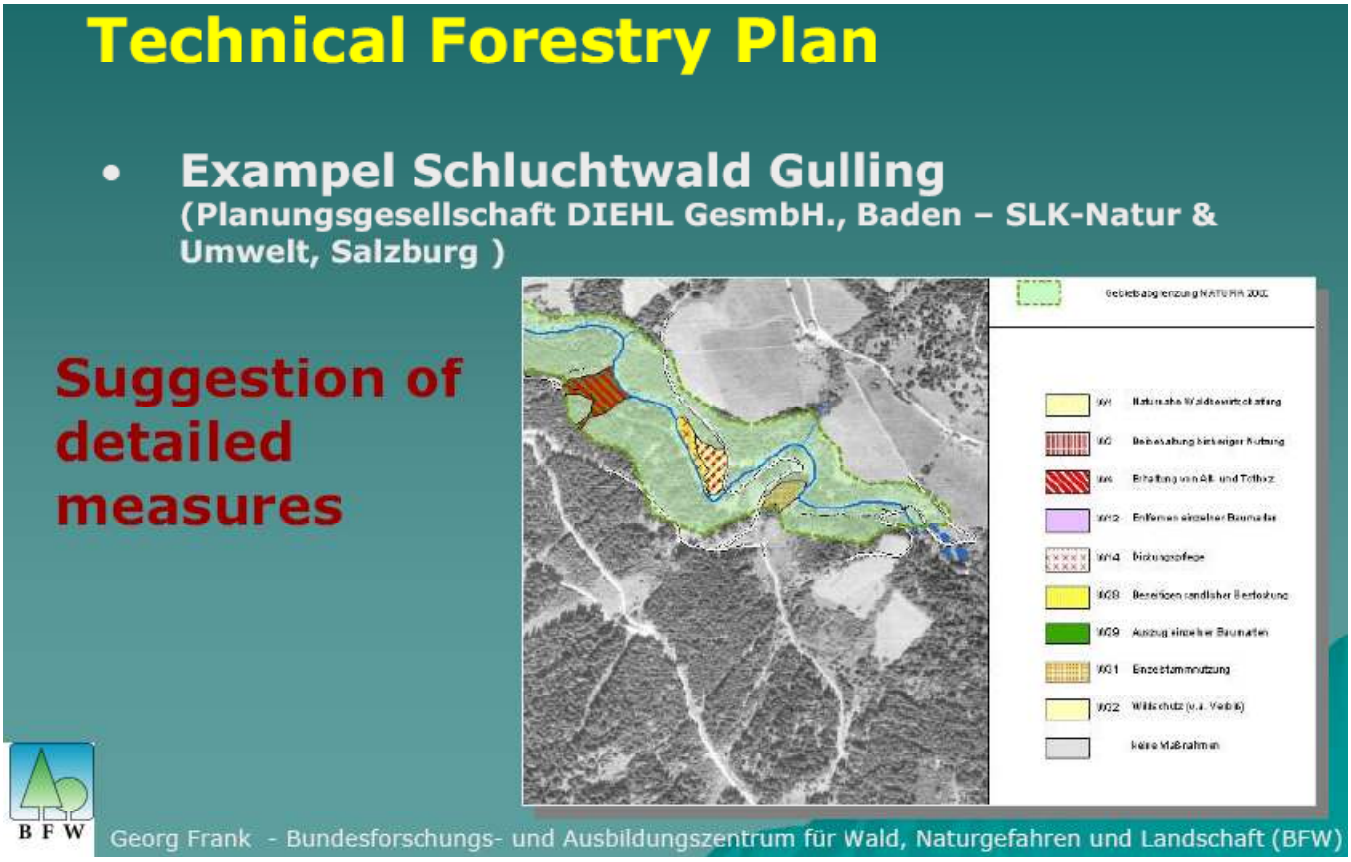


The implementation of Natura 2000 results in amendments of nature conservation acts and the need to adapt other legal instruments, e.g. hunting and fishery acts. All Provinces have designated so called "Europaschutzgebietes" within their provincial laws, except Tyrol, which uses the category "Natura 2000".

Only one Federal Province binds for explicit preparation of a management plan for each Natura 2000 area "Europaschutzgebiet" by its nature protection act. There are different approaches in the Provinces but consensus about content and structure. As a minimum standard, management plans should include:

1. Assessment and delineation of habitats and area of species
2. Evaluation of the conservation status of habitats and species
3. Determination of conservation goals
4. Suggestion for measures and treatment
5. Suggestion for monitoring

A specific Austrian instrument is the Technical Forestry Plan, defined by § 10 Austrian Forest Act 2002. The Technical Forestry Plan can be worked out from the forest owner academically educated foresters respectively and contains planning instruments for the use of the forest resources. It is a non- legally binding instrument on voluntary basis.



The main benefits of the instrument can be considered the follows:

- Participation of land users
- Knowledge of local foresters available
- Bottom-up approach – increasing acceptance by end-users

- Use of forest inventory / forest management plan data usable
- Calculation / estimation of costs much easier

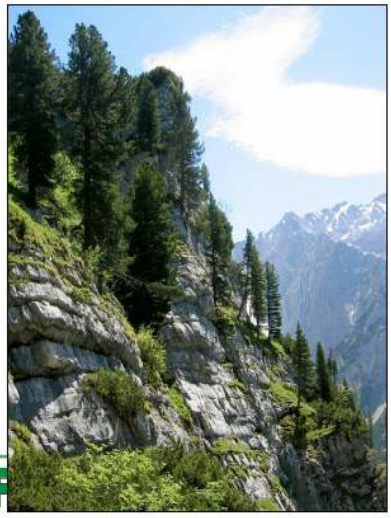
There are some pilot projects, through which the use of Technical Forestry Plans for Natura 2000 management purposes has been tested successfully.

Delineating the FFH-habitats through GIS and remote sensing in the context of the project "Information System for Alpine Forest Sites" for the Bavarian Forest Administration

STEFAN BINNER, JÖRG EWALD, RUDOLF SEITZ AND STEFFEN ROGG

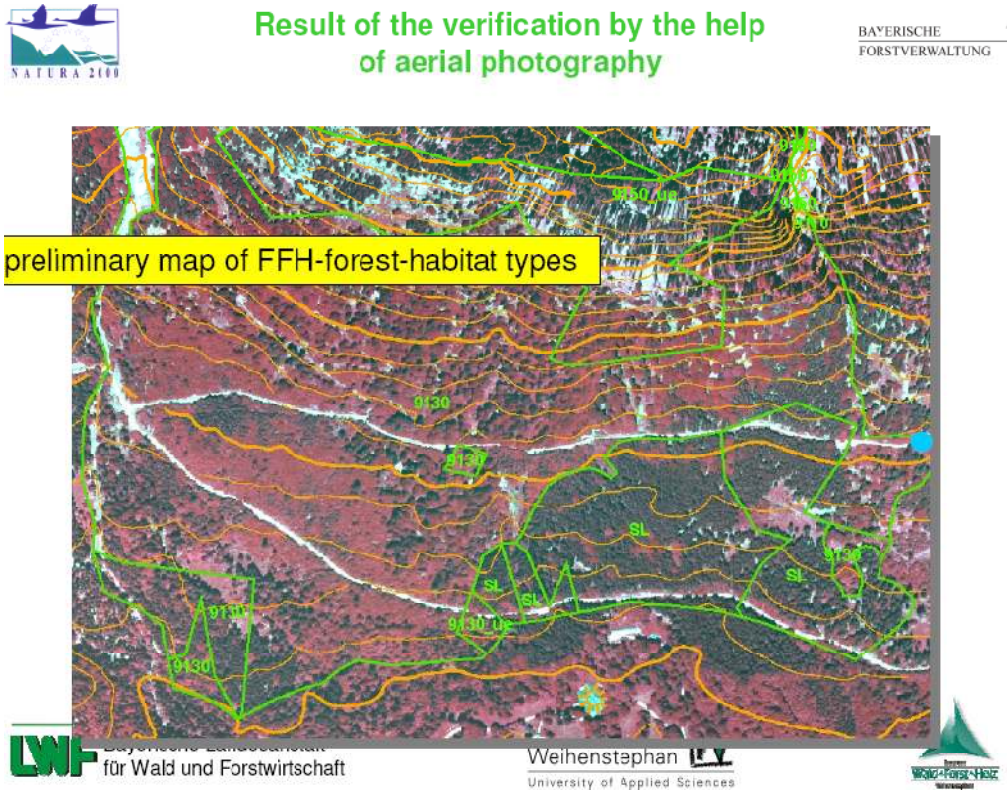
In the context of the project "Information System for Alpine Forest Sites and delineation of FFH-habitats", the University for Applied Sciences Weihenstephan (Germany) in cooperation with the Bavarian Forest Administration developed a procedure on the basis of GIS and Remote Sensing to demarcate Annex I habitats in the alpine region for the European NATURA 2000 network (Lang A.; Lorenz W.& Walentowski H. 2004).

- **Problem**:
  Large scale site maps as basic information for the delineation of FFH-forest-habitats are missing for more than 90 % of the total alpine region



The result consists of maps, formed on the basis of forest site assessment results, showing potential habitats. The comparison of the potential and actual habitat distribution is performed by the

experts of the Bavarian Forest Administration applying Remote Sensing (potential-actual-comparison). In this process, tree species composition and structure of forest stands are assessed by the use of object-based segmentation software and additional classification. Finally the results are combined with the modeled habitats within a GIS. This additional information basis allows the correction of the habitat borderlines gained from the modeling process as well as the assessment and delineation of "miscellaneous habitats" (for example, pure spruce stands on sites suitable for mixed alpine forests). The resulting preliminary habitat map is then verified in the field and corrected if necessary. At the end of this process, maps of the actual forest habitats are generated, which forms the basis for management planning.

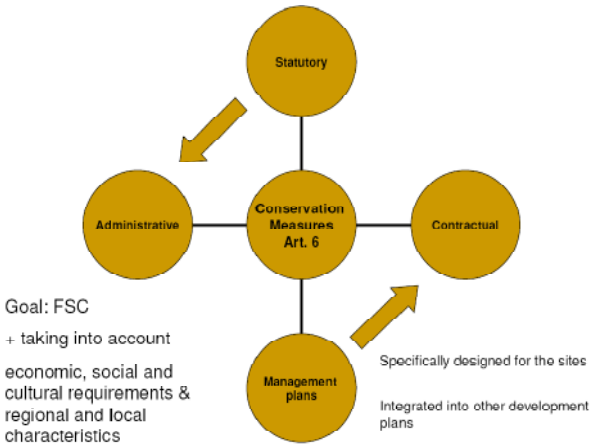


Forest management planning in the context of nature conservation and forestry policy in Slovenia

ALEKSANDER GOLOB

Forests cover 70 % of Natura 2000 sites in Slovenia and a half of all forests are a part of these sites.

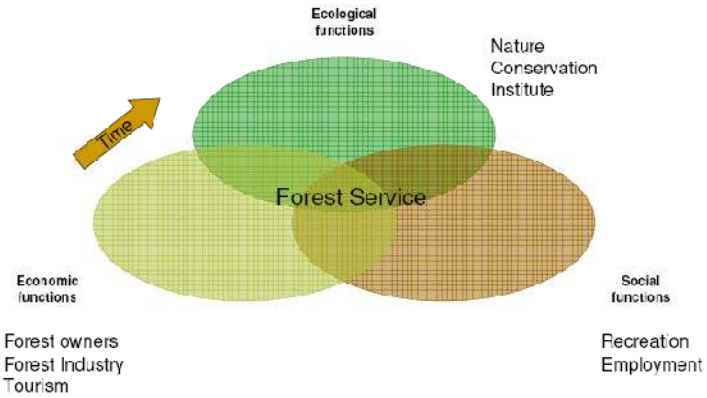
Favorable conservation status of the relevant habitats and species should be ensured on all sites using statutory, administrative and contractual measures and management plans, if appropriate. It seems that forest management plans are a good example of sustainable development plans into which biodiversity conservation measures should be integrated.



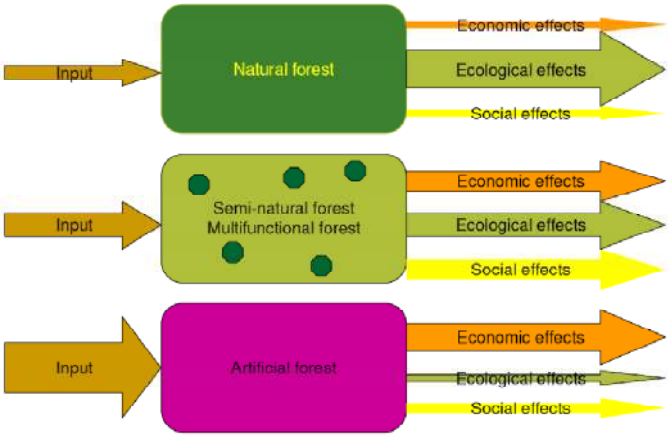
There is a long tradition of forest management planning in Slovenia comprising all forests irrespective of ownership. The plans, whose preparation is financed from the state budget, are an indispensable instrument for balancing the ecological, social and economic functions of forests. The forest management goals set in the Forest Development Program of Slovenia as well as in the plans are based on the principles of sustainability, multifunctionality and a cognitive close-to-nature approach.

The latter is especially underlined in the expression laid down in the Forest Act saying that forest management should strive towards the conservation and reestablishment of the natural indigenous composition of forest living communities. Building on natural and semi-natural forest structures and mimicking succession processes in forest management is therefore the central characteristic of the Slovenian forestry school.

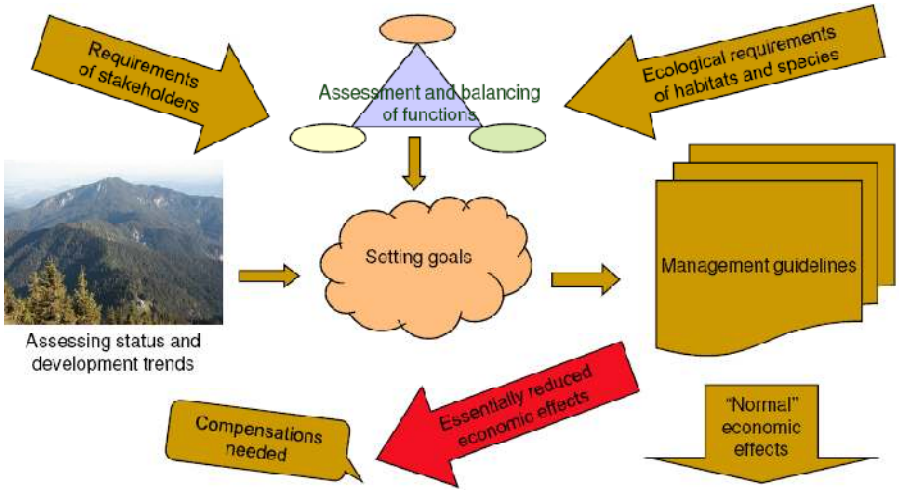
The basic aim of managing Natura 2000 sites does not differ substantially from close-to-nature forest management as established in the theory and practice of forestry in Slovenia. However, the measures for maintaining a favorable conservation status of various species will require certain adaptations of the actual forest management plans and their

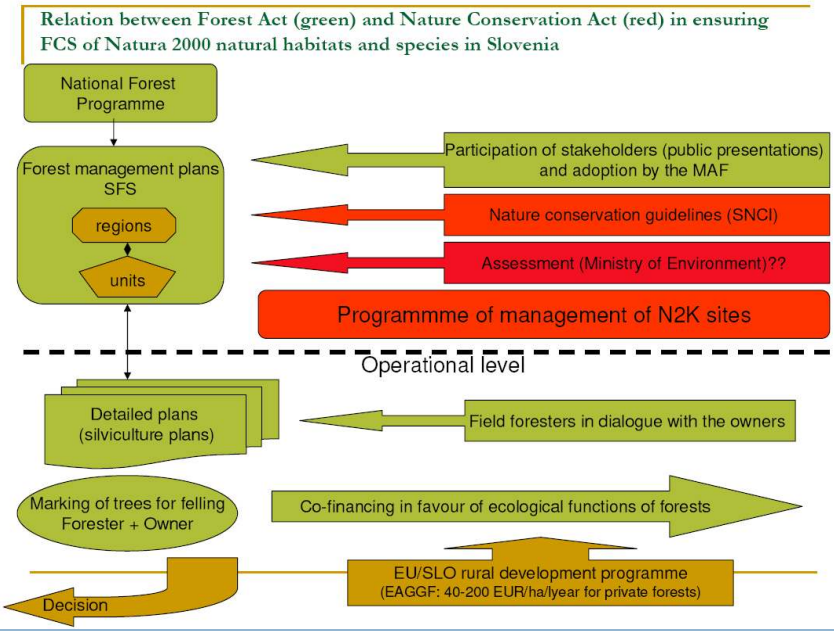


implementation. This relatively minor correction would be a successful demonstration of the integrative concept of forest biodiversity conservation, which however would not exclude creating areas of exclusive importance for nature conservation.



Forest management plans play the central role in Slovenia not only in implementing the principle of multi-purpose but also the principle of ecosystem or close-to-nature management. The latter builds on cognitive approach, where development of forest ecosystems under the factors of natural disturbances as well as management interventions is carefully monitored through long periods (in some areas plans were regularly made for more than hundred years). Management goals are always set on the basis of recognitions of processes and reactions of the forest ecosystems to various management approaches on specific sites. It is believed that the advantages of such an approach are twofold. From the nature conservation perspective, forests remain naturally and semi-naturally structured and biologically diverse. From the economic point of view, however, there is probably less income due to some lower cutting intensity and quality on one hand, but on the other there are also lower expenditures for planting and various forest protection measures, which are not needed in natural forests.

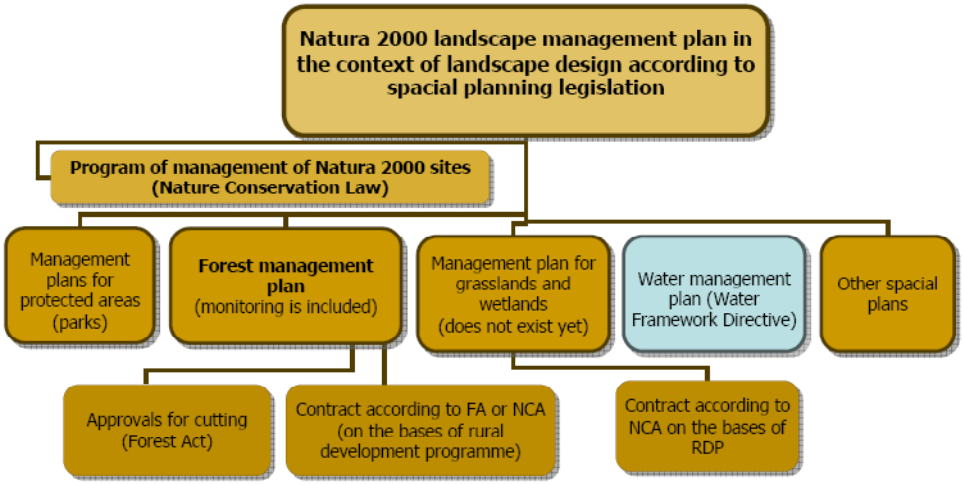




Forest management plans will apparently play a crucial role in maintaining favourable conservation status of the forested part of Natura 2000 sites in Slovenia. In addition to the actual ecosystem forestry orientation of the plans, they will have to include specific guidelines for maintaining favourable conservation status of species with various ecological requirements that the forests host. These specific guidelines will be partly produced by the team of experts of Slovenian Forest Service, who is responsible for planning, and

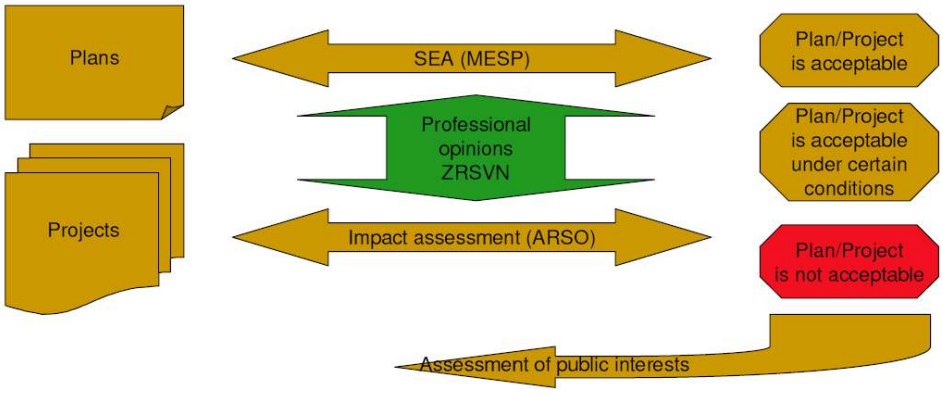
partly by the Slovenian Nature Conservation Institute, whose nature conservation guidelines have to be integrated into any kind of plans in connection with nature according to the Nature Conservation Act.

Nature Conservation Act otherwise does not provide for a tool similar to the forest management plans. Management plans are intended for protected areas and Natura 2000 sites could be part of these areas. Only a smaller proportion of Natura 2000 sites in Slovenia fall within the existing protected areas, so this planning instrument has a very limited importance. In addition, there is no real tradition in drawing up such plans, particularly not with the content needed to maintain a favourable conservation status of natural habitats and species.



An idea that has already been tested in Slovenia is to use landscape ecological planning for Natura 2000 sites to meet conservation objectives. Guidelines for such plans, which should be set up in collaboration with relevant stakeholders, should be taken into account in various sector plans, including forest management plans.

The most important administrative measure concerning Natura 2000 sites are provisions of Article 6(3) and (4), which have been duly transposed into Slovenian Nature Conservation Act. In this act, the ministry in charge of nature conservation is nominated as "the competent national authority which shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned". There is not enough praxis yet to be sure which components of the forest management plans will be assessed in this procedure. The fact is that forest management plans are not excluded from the assessment procedure although at the same time they are a crucial instrument for maintaining favourable conservation status. It would be logical to check only those activities of the plans, which would lead to certain projects - like forest road construction or certain interventions, which would represent a greater change of forest structure and function.



Another administrative measure provided in the Nature Conservation Act are nature conservation guidelines which ought to be integrated into the plans. If the Slovenian nature conservation institute (ZRSVN) concludes that the degree of integration is not sufficient, it is authorized to prevent a plan from becoming valid.

Conclusion

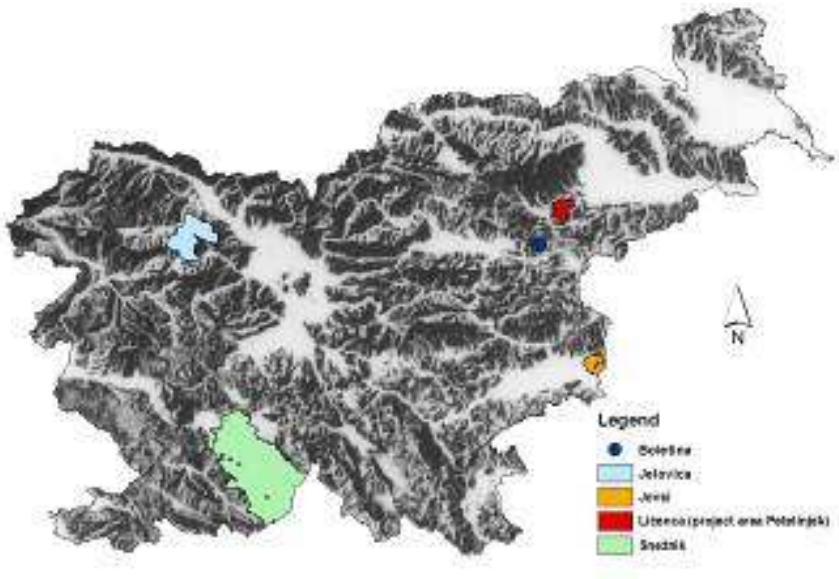
Requirements for ensuring favorable conservation status of various EU important forest habitat types and species living in the forest and forestland should be more explicitly incorporated in the plans. The plans should – especially in Natura 2000 forest sites – deal more with the preservation and establishment of key habitats for the species concerned and at the same time enable surveillance of their status through time. With such an improvement, the plans would represent a good example of designing an integrative nature conservation approach, which however should also be implemented in real life, where greater financial support for the achievement of the Natura 2000 goals would be needed.

Completion of forest management plans with the Natura 2000 topics

PROJECT LIFE: »NATURA 2000 IN SLOVENIA – MANAGEMENT MODELS AND INFORMATION SYSTEM«

ŠPELA HABIČ, GREGOR DANEV, DAMJAN VRČEK

The process of installing and completing of forest management plans in Slovenia is formed in the framework of the European project called Natura 2000 in Slovenia – Management Models and Information System (Project in continuation). The Project is performed by The Institute of the Republic of Slovenia for Nature Conservation and its project partners in the framework of LIFE III - Nature. The Institute of the Republic of Slovenia for Nature Conservation (IRSNC) and Slovenia Forest Service (SFS) participate in the preparation of installing and completing of forest management plans methodology.



The Project is composed of several actions, among them Action A3 - preparation of management plans for pilot project areas. In the framework of the Project's Action A3 the IRSNC and SFS will prepare completions of the existing forest management plans (FMP in continuation) in four pilot areas. The completed FMP will be one of the supplements of the pilot areas management plans and will represent the management plans for forest area inside the Natura 2000 areas. In the pilot areas, three Natura 2000 are declared in accordance with the Birds Directive and eight areas are proposed in accordance with the Habitats Directive.

Picture: Pilot areas of the project LIFE NATURA 2000 in Slovenia – Management Models and Information System

The management plans in pilot areas should actively incorporate all sectors and individual activities. Preparing the project management plans we want to show cases of good praxis in the Natura 2000 areas planning. Slovenia has no Natura 2000 management plan which would have passed the governmental procedures, because the sustaining favorable species condition and habitat types in the Natura 2000 areas is incorporated in the existing sector plans as imposed by the Slovenian legislature in the field of nature preservation. This is settled in detail in Article 12 of the Regulation on Natura 2000 areas.

There are 286 Nature 2000 areas in Slovenia, which represents 35.5% of the whole Slovenian surface. 70% of the entire Nature 2000 areas surfaces are in forest space, which represent approximately 50% of all Slovenian forests.

Slovenian forestry has a long tradition of sustainable and close-to-nature forest management. Within the framework of the tradition and good work the foresters have developed an integral system of natural source planning in forests. FMP represents the most integral system of natural source planning not only in Slovenia, but also in Europe. FMP in Slovenia is performed both for forests in country possession and private forests in the whole forest surface in Slovenia, which represents a great advantage over forest management planning in some other European countries. FMP of a forest management area and unit comprise all onsets for Nature 2000 topics completion.

Preparing pilot areas management plans we had to pre-arrange general security guidelines for the Natura 2000 areas (the result of the project action A2) and to make the guide for creating management plans in Slovenia (the result of the project action A1). They were both founded on the participative approach and all sectors of space use took part in the execution.

Picture: Security guidelines **Picture: Guide**

The topics of the management plans are described in detail in the Natura 2000 Areas Management Plans Topics Preparation Guide. The first part of the management plans (MP) comprises the general physical area description, ecological area characteristics (Natura 2000 areas, protected areas, natural values, ecologically significant areas), social-economical analyses of the area (age structure of the residents in the area and hinterlands, property structure …) and analyses of the past activities or use of space in the area (forestry, agriculture, nature protection, space management, tourism …).

In the second part, the synthesis, called ecological evaluation of the area, has to be performed by analyzing the collected data. Thereby we gather above all real and potential threats and on this basis we form long-term and short-term objectives for achieving the favorable sustainability condition of the Nature 2000 area. The ecological evaluation and general guidelines form special protection guidelines which are adapted to the area condition. We successfully cooperate with our project partner SFS in setting up the protection guidelines for forest management. It is very important to see the whole picture, set realistic objectives and consider the dynamic balance of the nature.

Methodology **NOT VALID for the Snežnik pilot area**

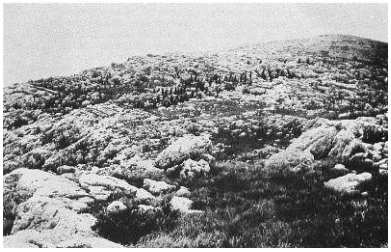
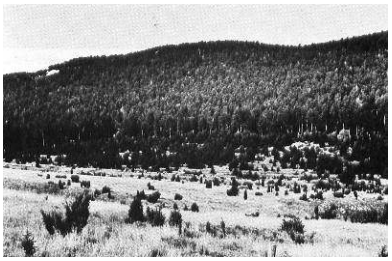
The series of the concrete protection guidelines for achieving the protection objectives is comprised in the materials called Nature Protection Starting-points (NPS in continuation). The concrete protection guidelines in NPS are listed in accordance with sectors.

The NPS and The Natura 2000 Topics Completion Methodology form the basis for completion of the existing FMPs and become management plans for Natura 2000 areas forest space.

Example: Snežnik pilot area

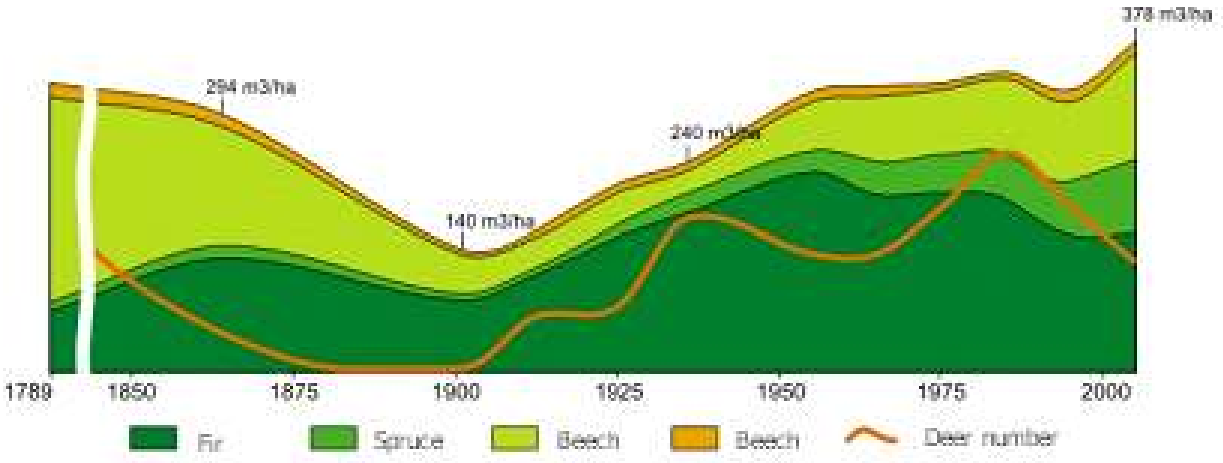
The largest pilot area of the project, "Snežnik", is situated in southwestern Slovenia in Postojna forest management area and covers 107.300 ha. Predominant is karstic terrain, more precisely dinaric high-karstic plateaus surrounded by karstic fields. 71% of the area is covered with forests. The extensive, compact forest complexes, the preserved natural environment and natural conditions shape up the exceptional biotic diversity in this part of Slovenia. Consequently, the major part of Postojna area is included into six SPA areas and 13 pSCI areas with the total of 96 species and 31 habitat types that have to be maintained in favorable condition in accordance with the decrees on birds and habitats.

The planned forest management in Postojna forest management area has an over 100 year long tradition. One of the reasons for the beginning of the planned management of Javornik-Snežnik forests fifteen years ago was large reduction of forest surface in Karst and Pivka valley. The bare, rocky karstic landscape was laid open to intense pasture. The foresting of the barren land in the Pivka valley with black pine began about a hundred years ago. The later social changes caused accelerated abandoning of agriculture and, consequently, overgrowing of former agricultural grounds. Rather quick succession processes in Pivka valley, which is a part of Natura 2000 area, pose the following question: Should we protect the (present?) condition in the Natura 2000 areas or the processes running in the nature?


Picture 1: Jurišče 1895 Picture 2: Jurišče 1985 Picture 3: Upper Pivka 2004

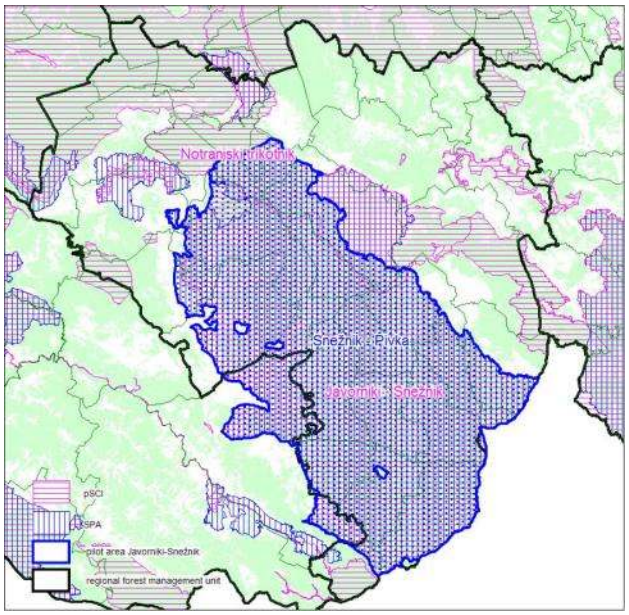
In the last two hundred years, also Javornik-Snežnik forests have been considerably changing. We can find information about them in the oldest forest management plans (from 1864 on) and in other sources. The precious series of data on forest condition in the past gives us insight in the changing of tree species mix, growing stock and some other parameters.



Picture: Oscillation of tree species shares, growing stock and deer population number in Snežnik forests in the period 1789 – 2005 (Habič, 2005)

Also the forests being called well-preserved and stable with right are constantly changing. The dynamics of the natural habitats should be one of the basic conditions for Natura 2000 areas, as the nature cannot be "frozen" in unchanging condition.

The Nature 2000 Snežnik pilot area comprises one SPA area: Snežnik-Pivka and two pSCI areas: Javorniki-Snežnik and Notranjska triangle (a part). In general we estimate the condition of species population and habitat type linked to the forest or being a part of it to be favorable. This is to the greatest extent the consequence of the up-to-now close-to-nature, sustainable and multi-use forest management.



Picture: Situation of the Snežnik pilot area in Postojna (and partly Sežana) forest management area

Forest management plans for all forests are prepared on two levels: for the whole forest management area and for forest management units. Due to the size of the Snežnik pilot area we decided to complete the Postojna area forest management plan for the period 2001 – 2010 in the framework of Life project. Referring to the form and contents, the Slovenian forest management plans are, with certain completion, appropriate for Natura 2000 forest management plans.

Transferring the nature protection topics referring to the Natura 2000 areas we must consider the already running planned forest work and the integrity of the forest space and activities in it. For this reason, firstly a quality evaluation of species population and habitat type condition in the area must be preformed. The objectives for the Natura 2000 area must be set to the purpose, rationally and they must be, at least in long run, realizable. We delineate the way for achieving the objectives by the means of appropriate guidelines, but for performing the rationally planned measures it is also necessary to ensure financial means.

The majority of forests both in the Snežnik pilot area and in Slovenia are private. Therefore the forest owners must agree to the planned activities for the maintenance or establishing the favorable species and habitat type condition in the forests. They are the ones who actually "manage" the forests and it is understandable that they expect financial compensation for performing the Natura 2000 measures or limitations they impose. A lot can be done also by appropriate education and raising awareness of the owners.

Forestry and hunting are not the only fields affecting the Natura 2000 areas. Many other participants whose interests often diverge from the nature protection efforts are present in the same space. We can expose the planned construction of the wind power plant at the edge of Snežnik plateau or the planned tourism development in the heart of Snežnik forests. Such interventions in the space can vitally endanger the objective achievement in the Natura 2000 areas, above all if they take place sequentially and the multiplicate effects of all interventions are not considered when evaluating their acceptability. As the first domino falls…

Therefore, the thoughts about preservation of such large and complex areas are appropriate. Some years ago, such considerations in the case of Snežnik were very highly topical, but were not proceeded. They appear to be one of the possible answers to both the integral area management (in addition to the already settled management of individual sectors) and for the integral ensuring of the area congruent with the protection of the most significant parts of the nature.

Forest management plans for forest management areas and units and silviculture plans as means for maintaining the favorable status of NATURA 2000 areas

DRAGAN MATIJAŠIĆ, TOMAŽ DEVJAK, MARKO UDOVIČ

The planning system in forestry is based on the decrees of the Act on forests, Forest Development Program, forest management plans for areas and planned forest management units. Slovenia is divided into 14 forest management areas and 236 forest management units (Fig. 1).

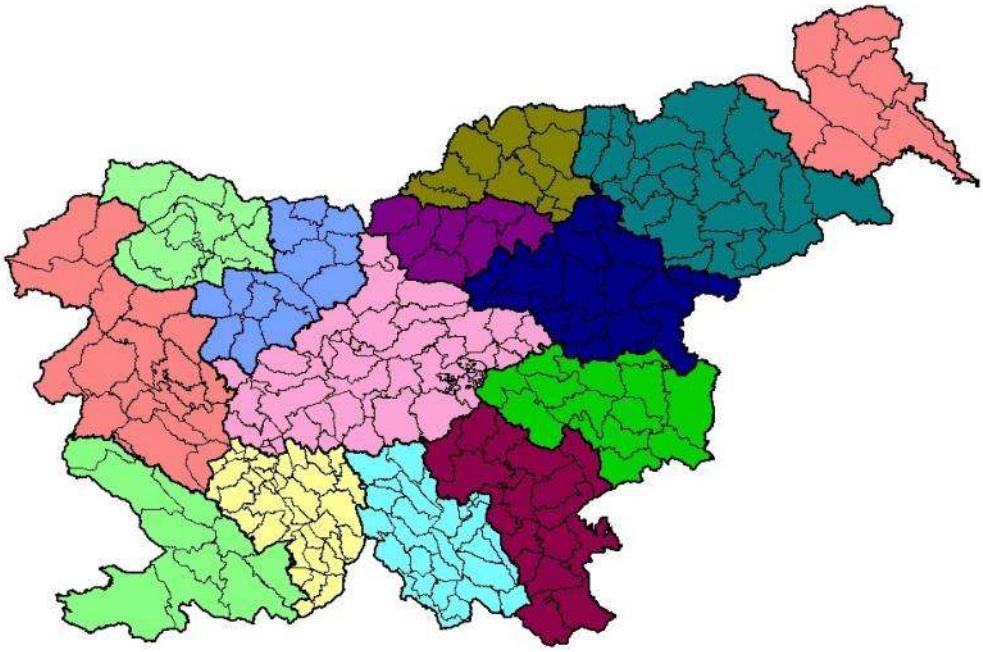
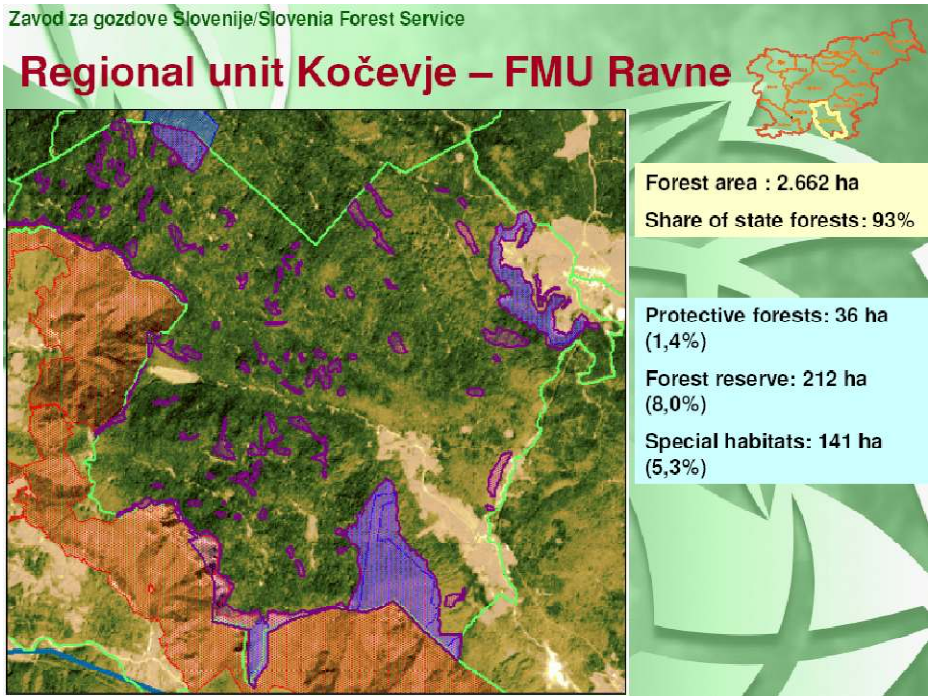


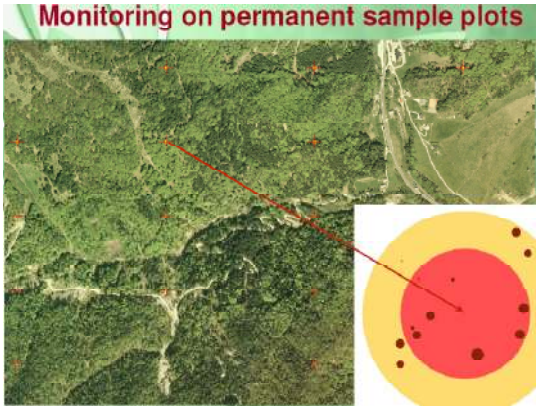
Fig. 1: Forest management areas and forest management units

The forest management plans are basic professional documents determining the objectives of the sustainable, close-to-nature and multifunctional forest management and guidelines and measures for their realization regardless of the ownership.

The regional forest management plans are passed by the Government of the Republic of Slovenia in accordance with the procedure imposed by the Act on Forests. The plans comprise description of forest condition (i.e. summary from forest inventories of all forest management units) with the analysis of the past management. At the same time, the objectives of the forest management are determined according to the management classes and the guidelines and measures for their realization are laid down. An important part of the regional plan is the map of forest functions. Among the numerous guidelines the stress should be laid on the guidelines for the maintaining the favorable condition of forest ecosystems and vital animal species, guidelines for forest functions improvement and preservation of protected forests and forest reserves. Procedures for passing the mandatory consideration of guidelines prepared by The Institute of the Republic of Slovenia for Nature Conservation are running. The public also participates in public layouts and public hearings. Ministry for Agriculture, Forestry and Food, Ministry of the Environment and Spatial Planning and Ministry of Culture must agree to the proposal of regional plans that are being renewed in the 10 year cycle.

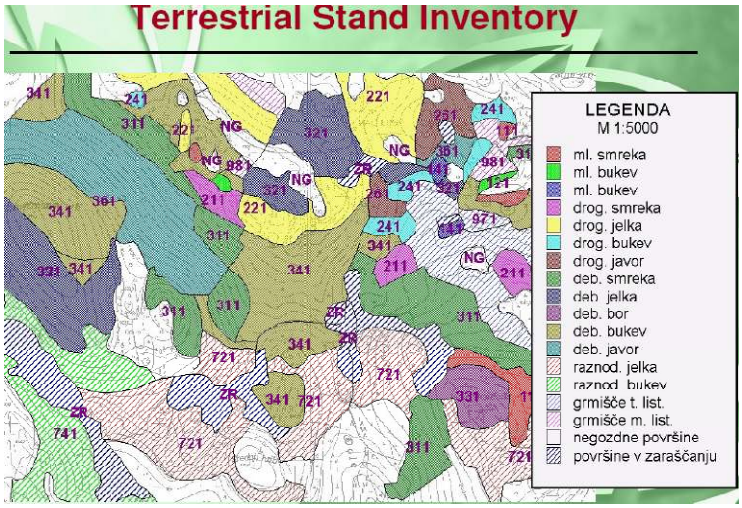


The forest management plans of forest management units (236 in total) are passed by the Ministry for Agriculture, Forestry and Food. They are made on the basis of the Regulations on Forest management and Silviculture plans (1998, 2006). The plans comprise the data on forest condition based on the results of forest inventory performed for this purpose and on descriptions of objectives, guidelines and measures. Forest inventory is based on the data from the **permanent sample plots** and the data from forest stands description. In addition to the ecological and dendrometrical parameters (breast diameter, tree height, stand situation etc.) also the structure and number of dead trees, both standing and laying, is noted on permanent sample plots. In the future it will be possible to increase the number of the gathered parameters on the permanent sample plots on every site where they will be usable for monit oring forest ecosystems in NATURA 2000 areas.



Forest stands are homogenous forest parts having a similar development phase, similar structure and similar tree species composition. The stands are demarcated in the field with regard

to the Regulations on Forest management and Silviculture plans (1998), internal instructions by SFS (1998) and stand description code book. Thereby we use digital orthophotographs and silviculture plans. The stands act as a forest information bearer and a forest management planning unit at the same time.



In the areas with rare and/or protected animal species we rank individual stands sized up to some hectares in the so-called **eco-cells**. As a rule, we do not plan special measures or we plan only the measures for maintaining of favorable habitat condition for the specified protected species in those areas.

The objectives and guidelines in the forest management plan of a unit are concretized by the quantification of the measures. Therefore the planned allowable cut, silvicultural activities and forest functions related works are determined on the level of forest management classes and on the level of individual stands or compartments/sections. In the procedure of adoption of forest management unit plans the public participates in public layouts and public hearings. Consideration of nature protection guidelines prepared by The Institute of the Republic of Slovenia for Nature Conservation us mandatory in the procedure, but the opinions prepared by local communities and the Institute for the Cultural Heritage of Slovenia also play an important role.

Silviculture plans are execution plans concretizing the provisions of forest management plans of areas and units. They are prepared in cooperation with the forest owner and form the basis for marking the trees for cutting as well as for paying the incentives for silviculture works (tending the young growth, thicket etc.), protection works (protection from game etc.) and forest function works (maintaining forest clearings, water sources etc.). While preparing silviculture plans, particular attention is directed towards those forest stands where the renewal has to begin. The renewal is based on the natural rejuvenation in the range exceeding 95% on the level of Slovenia.

The present forest management planning system already considers the habitat conservation requests determined in the decrees on birds and habitats. We estimate no larger professional efforts and financial means will be needed for upgrading those forest management plans covering also NATURA 2000 areas in forest areas to the management plans for these areas.

Results of the workshop

ALEKSANDER GOLOB

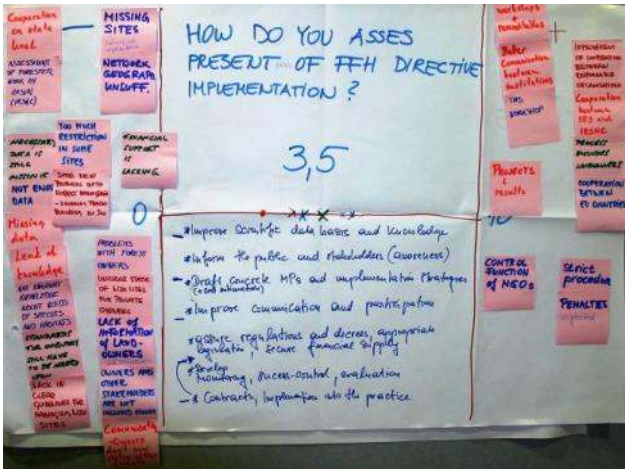
PARTICIPATION

After two days of presentations with scientific and operational background as well as exchange of views during the field trips into Slovenian forests, where 44 experts and stakeholders participated, a group of 13 people gathered on October 4th 2006 at Mašun to sum up the lessons learned, assess the actual status of implementation of the Habitats and the Bird Directives in forests and formulate proposals for future actions. Six participants were from forestry research organizations (Stefan Mueller-Kroehling and Stefan Binner from Bavarian LWF, Georg Frank from Austrian BFW, Barbara Polanšek, Mitja Skudnik and Aleksander Golob from Slovenian GIS), four participants were from Slovenian Forest Service (Andrej Breznikar – workshop facilitator, Dragan Matijašić, Špela Habič, and Aleš Poljanec) one from Slovenian Institute for Nature Conservation (Gregor Danev), one participant was from Slovenian Fund for Agricultural Land and Forests (Tomi Ivanič) and one (Jožef Sterle) from GG Posojna, a corporation holding concession for exploitation of forests in the region.

The group leaders presented the results of each group to all participants.

GOAL AND METHOD

The participants agreed on the main goal of the workshop: to determine main barriers for proper implementation of the EU nature conservation directives and to indicate ways to overcome them. Two groups were formed in order to come up with negative and positive sides of implementation of the directives as well as propose adequate actions. The exercise had a rather brainstorming character implying that not every participant would agree with what was suggested.



The so called H method was used at the workshop.

POSITIVE SIDES OF THE HABITATS DIRECTIVE IMPLEMENTATION

Most important positive sides pointed out can be grouped into forest management, data gathering and communication components.

From the point of view of forest management it was underlined that the Habitats Directive supports ecosystem forest management and calls for an appropriate balance between preservation of nature and its economic use. It deepens the meaning of the existing nature based system of forest management and promotes sustainable forest management in a certain way. The directive assures clear criteria for biodiversity component of sustainable forest management and management requirements that should be taken into account in a careful planning system. Strict procedures are appropriate in terms of monitoring and reporting on the conservation status, where NGOs can play an important role. It was also mentioned that the directive requires inventing new approaches beyond classic protection mechanisms from nature conservation.

Another positive side of the Habitats Directive implementation is improvement of knowledge on forest biodiversity. New data are being gathered by mapping of species and habitat types important from biodiversity perspective. The existing forest monitoring system is recognized as valuable source of information when adequately supplemented by some additional parameters.

Implementation of the Habitats Directive requires better communication between institutions, interest groups and stakeholders, above all mentioning forestry and nature conservation institutions and services in charge, forest owners and their representative organizations, science and research community as well as NGOs among them. Many workshops and round tables are being organized contributing not only to the improved cooperation between the interested parties but also to the culture and the skills of communication and collaboration.

DIFFICULTIES AND CHALLENGES OF THE HABITATS DIRECTIVE IMPLEMENTATION

The participants listed a number of difficulties connected with the implementation of the Habitats Directive as a challenge for the future activities.

The implementation of the directive depends on reliable data on species and natural habitats distribution, but they are still missing. As a result of this network geography is insufficient in some countries, in others, for example Slovenia, appropriate zoning cannot be made within larger sites. Especially exclusive and scattered forest habitat types have not been adequately mapped yet. There is also a lack of knowledge on the species and their ecological requirements, above all among foresters. It is frequently not clear which are real threats to some species. Standards for monitoring and evaluation of conservation status have therefore not been agreed yet.

Many participants were of opinion that pSCI selection process was not transparent enough. Better co-operation between authorities and institutions responsible for nature conservation and forestry would be needed. The concepts of ecosystem or close-to-nature forest management on one side and management requirements for Natura 2000 forested sites on the other have not been theoretically thought out properly. Foresters frequently feel that management limitations required by the nature conservation authorities are not

proportional with sensitivity of species or habitat types and that more limitations are required as needed (e.g. skidding trails construction). Nature conservation guidelines submitted by the nature conservation authority are often not clear and justified. The knowledge and ideas on adequate management of forests within Natura 2000 sites seem to be dispersed and it is difficult to adapt forest management plans to the directive requirements.

Since the delineation of the Natura 2000 sites is, according to the Habitat Directive a purely scientific exercise, the forest owners are usually informed about the fact that their forests are within Natura 2000 sites and that they will have to respect additional management guidelines at a later stage. It often happens that the first information regarding future management is not realistic. This provokes immediate request for compensation, which might not be justified or is extremely difficult to calculate. In absence of a system of compensations and incentives communication with the owners often becomes very difficult, especially if they are excluded from formulation of the management guidelines.

PROPOSALS FOR FUTURE ACTIONS

The list of future actions the participants agreed to (from most important to less important) is as follows:

1. Inform the public and stakeholders (awareness raising)
2. Improve scientific data basis and knowledge
3. Ensure adequate financing (incentives and compensations)
4. Improve knowledge of personnel through adequate training and education
5. Draft concrete management plans and strategies for their implementation, including cost estimation
6. Develop monitoring, success-control and evaluation
7. Improve communication and participation of stakeholders (forest owners) in decision making
8. Establish a Forum for Natura 2000 forested sites
9. Organize workshops for experts to continually reevaluate favorable conservation status
10. Assure regulations and decrees, appropriate legislation, secure financial supply
11. Use contracts for implementation on the ground

List of participants

št./no.	Ime in Priimek / Name & Family name	Organizacija / Institution	e-naslov / e-mail
1	mag. Aleksander GOLOB	GIS / Slovenian Forestry Institute	saso.golob@gozdis.si
2	Aleš POLJANEC	ZGS / Slovenia Forest Service	ales.poljanec@zgs.gov.si
3	dr. Andrej BONČINA	BF / Biotehnical Faculty dep. Of Forestry	andrej.boncina@bf.uni-lj.si
4	mag. Andrej BREZNIKAR	ZGS / Slovenia Forest Service	andrej.breznikar@zgs.gov.si
5	Andrej FICKO	BF / Biotehnical Faculty dep. Of Forestry	andrej.ficko@bf.uni-lj.si
6	Andrej STRNIŠA	ZGS / Slovenia Forest Service	andrej.strnisa@zgs.gov.si
7	Anton SMREKAR	ZGS / Slovenia Forest Service	anton.smrekar@zgs.gov.si
8	Anže JAPELJ	GIS / Slovenian Forestry Institute	anze.japelj@gozdis.si
9	Barbara POLANŠEK	GIS / Slovenian Forestry Institute	barbara.polansek@gozdis.si
10	mag. Bojan KOCJAN	ZGS / Slovenia Forest Service	bojan.kocjan@zgs.gov.si
11	Boris BOGOVIČ	ZGS / Slovenia Forest Service	boris.bogovic@zgs.gov.si
12	Borut DEBEVC	ZGS / Slovenia Forest Service	borut.debevc@zgs.gov.si
13	dr. David HLADNIK	BF / Biotehnical Faculty dep. Of Forestry	david.hladnik@bf.uni-lj.si
14	Dragan MATIJAŠIĆ	ZGS / Slovenia Forest Service	dragan.matijasic@zgs.gov.si
15	Edo KOZOROG	ZGS / Slovenia Forest Service	edo.kozorog@zgs.gov.si
16	Evgen OSTANEK	ZGS / Slovenia Forest Service	evgen.ostanek@zgs.gov.si
17	Frenk PRELEC	ZGS / Slovenia Forest Service	frenk.prelec@zgs.gov.si
18	dr. Georg FRANK	Bundesforschungs- und Ausbildungszentrum für Wald, Naturgefahren und Landschaft (BFW)	georg.frank@bfw.gv.at
19	Gregor DANEV	Zavod RS za varstvo narave / Institut for Natural Conservation of the RS	gregor.danev@zrsvn.si
20	dr. Hojka KRAIGHER	GIS / Slovenian Forestry Institute	hojka.kraigher@gozdis.si
21	Janez LEVSTEK	SKZGRS / The Farmland and Forest Fund of the RS	janez.levstek@gov.si
22	mag. Janez ZAFRAN	ZGS / Slovenia Forest Service	janez.zafran@zgs.gov.si
23	Jožef STERLE	Gozdno gospodarstvo Postojna / Forest Company Postojna	joze.sterle@ggp.si
24	dr. Lado KUTNAR	GIS / Slovenian Forestry Institute	lado.kutnar@gozdis.si
25	Marko JONOZOVIČ	ZGS / Slovenia Forest Service	marko.jonozovic@zgs.gov.si
26	dr. Marko KOVAČ	GIS / Slovenian Forestry Institute	marko.kovac@gozdis.si
27	Marko UDOVIČ	ZGS / Slovenia Forest Service	marko.udovic@zgs.gov.si
28	Maša TENČIČ	GIS / Slovenian Forestry Institute	masa.tencic@gozdis.si
29	Mateja BLAŽIČ	ARSO / Environmental Agency	mateja.blazic@gov.si
30	mag. Mirko PERUŠEK	ZGS / Slovenia Forest Service	mirko.perusek@zgs.gov.si
31	Mitja SKUDNIK	GIS / Slovenian Forestry Institute	mitja.skudnik@gozdis.si
32	Mustafa TERNIFI	SKZGRS / The Farmland and Forest Fund of the RS	mustafa.ternifi@gov.si
33	dr. dr. h.c. Nikolaj TORELLI	GIS / Slovenian Forestry Institute	niko.torelli@gozdis.si

34	Peter KRMA	GIS / Slovenian Forestry Institute	peter.krma@gozdis.si
35	dr. Peter SKOBERNE	MOP/ Ministry of Environment and spatial planning	peter.skoberne@gov.si
36	Rok PISEK	ZGS / Slovenia Forest Service	rok.pisek@zgs.gov.si
37	Stefan BINNER	Bayerische Landesanstalt für Wald und Forstwirtschaft (LWF)	sbi@lwf.uni-muenchen.de
38	dr. Stefan MUELLER KROEHLING	Bayerische Landesanstalt für Wald und Forstwirtschaft (LWF)	mkr@lwf.uni-muenchen.de
39	mag. Špela HABIČ	ZGS / Slovenia Forest Service	spela.habic@zgs.gov.si
40	mag. Tomaž DEVJAK	ZGS / Slovenia Forest Service	tomaz.devjak@zgs.gov.si
41	Tomaž HARTMAN	ZGS / Slovenia Forest Service	tomaz.hartman@zgs.gov.si
42	Tomaž MIHELIČ	DOPPS - BirdLife Slovenia, Društvo za opazovanje in proučevanje ptic Slovenije	tomaz.mihelic@dopps-drustvo.si
43	Tomi IVANIČ	SKZGRS / The Farmland and Forest Fund of the RS	tomi.ivanic@gov.si
44	Vili POTOČNIK	ZGS / Slovenia Forest Service	vili.potocnik@zgs.gov.si

This project has received European Regional Development Funding through the INTERREG IIIB Community Initiative

Alpine Space KnowForAlp

Interreg III B

Issued by Slovenian Forestry Institute – Gozdarski inštitut Slovenije

Editor: Aleksander Golob