



## **LAYMAN'S REPORT**

on

**LIFE NATURE PROJECT RO / 000027**

**RESTORATION FOREST HABITATS FROM PIETROSUL  
RODNEI BIOSPHERE RESERVE**

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## Introduction

The cembra pine is naturally distributed in Austrian, Swiss, French and Italian Alps Mountains between 1 200 and 2 500 m elevation. It also occurs in Romanian, Polish, Ukrainian and Slovak Carpathian Mts. In Romania, the species has its altitudinal span between 1 400 m and 2 000 m growing mixed with dwarf pine and spruce. Cembra pine is important for many reasons like for reforestation of the sub alpine zone, furniture, handicrafts, landscaping, etc. It grows together with spruce and dwarf pine. Among the three woody species from Pietrosul, the cembra pine was the most destroyed, so that, today less than 40 over-aged trees have survived.



*Degraded cembra pine population that must be reintroduced*

The dwarf pine from Pietrosul occurs between 1 600 m and 2 000 m elevation and the species trend is decreasing. Through its continuous carpet, it plays a positive role in soil protection against erosion. But, during the 1970's on the northern slope of the Pietrosul Mountain the species was cut on a large area for land grazing creation. After that the cleared area became an avalanche track where five people were killed recently.



The spruce is the third tree species that occurs from 500 m to 1 650 m elevation in Pietrosul Mt. It was also cut illegally by the local people and shepherds.

## Scope and objectives

Taking into account the habitats degradation, a LIFE-Nature project was implemented in the Pietrosul Rodnei Mountain between the years 2004 and 2007.

The main project objectives were, as follows:

- Restoration of *P. cembra*, *P. mugo* and *Picea abies* natural habitat on 50 ha from the Pietrosul Rodnei Mountain;
- Conservation of all flora and fauna habitats on 6 415 ha including *P. cembra* / *P. mugo* / *Picea* / *abies* one from the Pietrosul Rodnei Biosphere Reserve

All planned actions were solved in the frame of the project and the major ones are presented here.

## •Distribution of woody species

In order to get details about the distribution and structure of the woody species habitats, during the vegetation season of the 2005 year a comprehensive survey all over the Pietrosul Rodnei Biosphere Reserve was done. The survey focused on each of the three altitudinal levels of vegetation currently recognized, such as:

- mountainous level with two sub-levels
  - average sub-level between 740 and 1100 m elevation;
  - high mountainous sub-level between 1100-1500 m elevation;
- sub-alpine level between 1500 and 1900 m elevation;
- alpine level between 1900 and 2003 m elevation.

The mountainous level with its average sub-level between is characterized by the occurrence of the beech (*Fagus sylvatica*) and spruce (*Picea abies*) forests where sycamore maple (*Acer pseudoplatanus*), rowan (*Sorbus aucuparia*)

and silver birch (*Betula pendula*) scattered trees can vegetate.

Sub-alpine level is characterized by the occurrence of the scattered or in groups, the following woody species: cembra pine, common juniper (*Juniperus communis*) and rhododendron (*Rhododendron myrtifolium*).

In its composition, the alpine level has small trees or bushes of netleaf-willow (*Salix reticulata*) and blue berry (*Vaccinium myrtillus*).

It should be stressed that survey took into account not only woody vegetation but all environmental conditions in which it develops, such as: geology, geomorphology, and hydrographic factors.



*Cembra and mugo pines associated with spruce*



*Well conserved dwarf pine*

#### • Inventory of tree and shrubs species

There were found 57 species, of which 14 trees, 26 shrub and 17 sub-shrub species. The cembra pine, dwarf pine, spruce, rowan and green alder (*Alnus viridis*) are the most important woody species within the Pietrosul LIFE project area. Some of these species a important at

European level, such as: dwarf pine is included in the Annex I Habitats Types from Nature 2000 while spruce and cembra pine are components of *habitat type according of the Habitats Directives*. In addition, cembra pine and dwarf pine are included in the Romanian Protected Species List.

It should be stress that in the Pietrosul, a large population of cembra pine was present in the past but now, the remainder trees is less than 40 and most of them are very old and highly isolated each other so that their regeneration was stopped. This demonstrates that the plantation through LIFE project will prevent the extinction of the species from Pietrosul. It is significant to note that during our investigations on the sub alpine zone, within the project area, just in the Zanoaga Mare Hollow a new dwarf pine form or variety was found which is now tested including through genetic way.

#### • Scientific inventory of herbaceous species

Across the Pietrosul Rodnei Biosphere Reserve, a comprehensive inventory of the herbaceous species was made a number of 568 herbaceous species distributed within 58 families, were found. Most species grow on alpine and sub-alpine pasturelands while inside the conifer forest, the species occurrence poorer. For Romania, there were found 22 endemic species, 18 rare species, seven protected species and nine strictly protected and included in the Red List species. The red list comprises the endangered species and they require higher protection than any others. In addition, a number of seven threatened species at European level included in special list (the IUCN List) were also found in the Pietrosul Rodnei Biosphere Reserve. The shepherds and tourists use to collect wild flowers and together with the domestic animal grazing they represented a destructive factor to the flora and fauna.



*Leontopodium alpinum*



*Rhododendron myrtifolium*

#### • Scientific inventory of birds

A very detailed inventory of the birds was made by a specialist (ornithologist) who explored a few years in the Pietrosul Mountain area and during his survey, a total of 86 species were recorded. Some of these species are nesting in this area while the others are passengers. Of the 86 species, 10 are present on the Romanian Red List, and three of them (spotted eagle, lesser spotted eagle and golden eagle) are included in the European one. Some of them are singing birds and they are living mostly in not too dense forests.

#### • Scientific inventory of mammals

Comparing with the previously mentioned species, these ones are represented by 40 species and some of them are big (red deer, brown bear, wild pig), some of them have middle size (chamois, red fox), and some of them are small (red

squirrel) or very small (mice). Some species like wolf, lynx, and brown bear, wild cat require strict protection, and they are included in the Red List. In the past, the illegal hunting caused serious damages in wildlife, but at present there is a guard team who is limiting the destructive actions on the whole National Park, including the project LIFE planted area.



*Black goat must be protected*

#### • Plantation management plan

A technical management plan was conceived, comprising step by step all operations aiming at species planting on 50 ha. This project comprises all actives connected with seed origin, seed collection and processing, seedlings production including nursery techniques and planting techniques. Finally all material and manpower costs were evaluated.

• **Effective restoration of the forest vegetation in the Pietrosul** is one of the major actions to be implemented. In order to achieve this objective several sub-actions, subsequently presented, should be solved prior plantation.

#### • Land marking

A number of 12 350 conifer wood sticks (100 x 5 x 5 cm size) were prepared to be used for marking the place where the seedling beds have to be hoed up. The workers have carried on their back the sticks and distributed them on the field.



*Carrying sticks on the back*

- The place of the seedling beds distributed all over the 50 hectares were marked by using the previously mentioned sticks.



*Land marking*



*Seedling bed*

- The 12 350 seedling beds, with their 80 x 80 cm size, were prepared by digging at the end of the June, just after the snow melting. At this time the work is much easier made than on the end of August (planting period), because the soil is moist and the plant roots are not so strong. Because of the extremely harsh environment conditions (compact and/or lack of soil, dense *Vaccinium* sp. and herbaceous layer, stony ground, presence of bushes, etc.), this operation was made by the mountain special hoe. According to the site conditions, two kinds of tools were used, such as: the hoe when the soil was rock less and crowbar when the seedling bed substratum consisted more of stones than soil.

- **Seedling origin and their production.** Cembra pine seedlings originate in the Lala Valley natural forest located near the Inau

Mountain, a massive included, as Pietrosul, in the same Rodnei Mountains range. Therefore, the seedlings have the same genetic and ecological requirements as that from Pietrosul Mountain where the project area is placed. Prior to launch the Project, the seedlings were already produced in the Sinaia Nursery belonging to the Bucharest Forest Research and Management Institute. The seedlings were grown in individual plastic bags fill in with soil taken from spruce forest. At the planting moment the seedlings were seven years old and about 60 cm tall. Such well developed and potted seedlings have ensured the planting success.

Dwarf pine and spruce seedlings have their origin in the Pietrosul Mountain i. e. very close to the project area.

All seedlings were produced by the ICAS as beneficiary / partner at its Sinaia Nursery located at about 700 m elevation.



*Seedlings in the Sinaia nursery prior transportation*

From the Sinaia Nursery, the seedlings were transported to Borsa (intermediate deposit) and then to Pietrosul



*Seedling deposited in Borsa*



*Seedling transportation to Pietrosul*

#### • Seedlings distribution to the seedling beds

By using wood baskets, the potted seedlings were carried on their back by the workers to the planting beds. Because of the basket weight (about 30 kg) and sloppy land and wild vegetation, this work was very hard and difficult. For transportation 12350 potted seedlings, about 400 up and down runs took place.



*Seedling charring on the back, a hard work*

#### • Planting site, planting design

The planted area is laying out on the northern slope of Pietrosul Mt. between 1600-1950 m elevations, namely across the Zanoaga Mare and Piciorul Mosului.

The initial foreseen planting design. Because an ecological plantation was assumed to be made, the tree too tree distance varied between 2 to 20 m, i. e. a 10 x 10 m average distance was taken into account. The intention was to restore the past local landscape, if possible. For this reason, an irregular planting framework was adopted. A total of 12350 potted seedlings was planned to be planted of which 4850 *cembra pine*, 5000 *dwarf pine* and 2500

*spruce*. As the *cembra pine* and *spruce* trees are "tall" species while the *dwarf pine* is a dwarf trees, this last species was planted at irregular distance, among the other two tree species. This infusion with *dwarf pine* will speed up restoration of the above ground carpet which soon contributes to the soil protection.

#### The real applied planting design:

Taking into account the newly acquired information about the planting area, the initial plan was slightly improved. It was learned that after previous trees cutting, the Piciorul Mosului steep slope became a place with avalanche occurrence. Two avalanches occurred on winters of 2005 and 2006 when five people were killed. Consequently, in order to prevent the avalanche initiation it was decided to increase the plantation density by planting in addition an amount of 5 550 seedlings of which 2 350 *cembra pine* and 3 200 rowan local provenance, i.e. a total of 15550 instead 10 000 seedlings on the same 50 hectares. There reason why the rowan was planted were, as follows: (1) it is naturally distributed all over the Pietrosul sub-alpine area; (2) at its early age it growth faster than any other local species so that the taller and denser the trees the most efficient against avalanche initiation and (3) in addition resistant to harsh climatic conditions. It is expected that at least for the long term, this mixed population will play a positive role in avalanche control.

#### •Plantation

The plantation was made in late August of the 2004, 2005 and 2006 years, consecutively. Plantation hole was of 30 x 30 cm deep and placed in the center of the seedling bed. Each seedling of *cembra pine* and *spruce* was planted separately in their own whole while one *dwarf pine* and one *rowan* seedling were planted in the same whole. The plantation used to be make at the end of the summer because at that time the climatic conditions are very favorable for the plantation success; this is due to presence of the moisture in the soil.



*Plantation activity*



*Cembra pine*

*(After plantation)*



*Dwarf pine*

#### • **Construction of refugee chalet.**

In order to sheltering scientists and technicians and workers during the plantation period and rangers, a two rooms refugee chalet including an attic was built of conifer wood closed to the project area. The indoor walls of the chalet were protected against cool by using a plastic isolation layer. For a better outdoor protection against moisture, the external walls were painted using a yellowish oil paint. For the same reason, the roof was painted with a two layers mineral oil of dark color. The inside refugee chalet was equipped with superposed beds and other strict necessary equipment. Altogether, 16 persons can be accommodated in the two rooms and the attic. At about 150 m away from chalet, a primitive toilet was built.

#### • **Conceive and implementation of a Long-term Conservation Management**

To enforce sustainable activities of all flora and fauna habitats from the National Park including the LIFE planted area, a long term Conservation Management Plan was conceived.

This plan foresees all sub actions according to which, the National Park and the project objectives are implemented. Some sub actions were implemented since 2004 year, i. e before finishing the management plan that was in full implemented on January 2007. For example, nine rangers guarding team was established in order to protect all plants and wild animals living in the area in question. Also, the public awareness is one of the key items of the plan and it consists in several activities. Since the last two years, a written Ranger Instruction-Guide was compiled. This guide foresee details about how the ranger has to act in all possible circumstances in order to prevent any damages to the flora and fauna habitats from the whole Rodnei Mountains National Park which includes the LIFE area, as well. The management plan foresees many restrictions, such as:

- reducing access of the tourists and local people to the important birds nesting areas and to those areas with a higher frequency of wild animals;
- the access of the armed people inside National Park was totally and permanently prohibited;
- a strong control of the hunters and stray dogs;
- the project area of 50 hectares was established as special protected area.

An agreement with the mountain police service was established and their help in conflict extinction has been essential. Owing to the above mentioned measures, flora and fauna habitats / species will have better conditions for conservation and development than in the past.

#### • **Monitoring of plantation success**

According to the inventory made at the end of May 2007 in the 10 check plots, the following results were obtained:

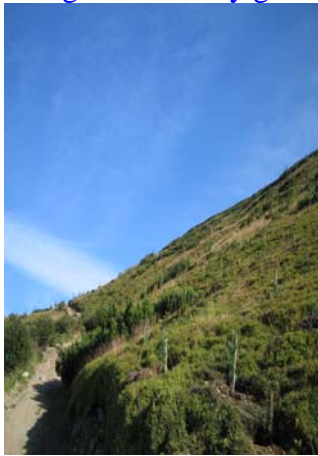
For cembra pine the average survival seedlings was as much as 96.3 % but the percent survival varied from plot to

plot, i.e. from 93.6 % in plot nine and 100 % in plots number 6, 7, 8 and 10;

For dwarf pine the average survival was slightly lower than in cembra pine, i.e. 94.2 % and variation was between 92.3 % in plot number 4 and 100 % in plot one.

In case of spruce the average planting success was 92.2 % and the variation was between 90 % in plot number 8 and 100% in some other five plots.

According to the Romanian legislation a minimum of 80 % survival is accepted as good and very good over 90 %.



*Plantation*



*Cembra pine*



*Dwarf pine*

• **Project website.** On behalf of the LIFE Project, on January 2005, a website was opened at the following address:

[http://www.icassv.ro/life\\_pietrosu](http://www.icassv.ro/life_pietrosu) with connection to the [www.icas.icas.ro](http://www.icas.icas.ro)

• **Local workshop and stakeholder consultation meetings**

Three meetings took place during the LIFE project implementation where the acquired results were presented and

discussed. Each indoor workshop was followed by a visit to the project plantation.

#### • **Public awareness**

In order to inform the people about the project implementation, several public awareness actions were developed, such as:

- installing 10 information panels in the Borsa / Pietrosul area containing specific inscriptions regarding the objectives and importance of the LIFE-Nature project for the Pietrosul Rodnei Biosphere Reserve;
- audio-visual presentations in media, including two video films took place;
- the project plantation was also presented at the National TV by the Romanian *Realitatea* Channel;
- the project results presentation in Power Point in many public institutions, like schools, universities, research units, forest districts and in an international conference..
- written materials like 4000 brochures and 2000 leaflets were distributed to a large number of people and institutions;



*Panel installed in the project area*



*Public awareness*

## • Expected results after plantation

*On immediate term:*

- restoration of *P. cembra* / *P. mugo* / *P. abies* habitats on 50 ha

*On medium term:*

- creation better conditions of life for herbaceous flora and wildlife followed by a normal future development;
- preventing soil erosion on the upper part and flooding in the down stream;

*On long term:*

- creation of normal conditions for natural regeneration of the *P. cembra* and *P. mugo* and *P. abies* species. Then, from Zanoaga–nucleus, these species extend little by little to the surrounding areas so that the population will be restored. It is assumed that *P. cembra* population from Pietrosul Mountain, which is very close to extinction, will be recovered at once the new planted trees will start to produce seed.
- preventing avalanche initiation.
- implementation long-term conservation management plan of all flora and fauna habitats from the Rodnei Mountains National Park and from project area, takes place. By this Plan, will be integrated the best measures for conservation of all flora and fauna species / habitats at a larger scale.

## • Project Cost and benefit

Total cost for the project implementation was 213 470 € and it is considered to be very small in comparison with the acquired results and with the cost of other LIFE projects that are more descriptive than pragmatic. The benefit could be appreciated in term of ecological effects and it was presented previously. Re-introduction of cembra pine and restoration cembra pinned / dwarf pine / spruce habitat and implementation of the management plan represent a real benefit. The highest financial contribution belongs to the European Commission.

## • Transferability of the project results

During the project implementation several original approaches were used and some of them can be transferred to other sites along the Carpathians or even the Alps Mountains. Some of the original used methods are present in brief.

- preparing the seedling beds in the spring save a lot of currency because the weeds' stems are destroyed during the winter frost and the roots are very weak; in such conditions the worker's work is much easier comparing with autumn preparation; in addition, during the summer time, the seedling bed soil accumulate moisture and makes the plantation easier during the autumn, and this means less currency for the manpower; this procedure is original;
- in Pietrosul, two seedlings, i. e. dwarf pine and rowan were planted in the same hole; this original procedure save currency for plantation and in addition such plantation better stabilize the soil; this original result;
- producing cembra pine seedlings without seed stratification represent another original method and because this procedure save a lot of currency, it could be called a small innovation.

The above mentioned original procedure could potentially be applied in other protected or non protected areas or in other member states. Our team is open to cooperate for the nature benefit.

## • Conclusions

- All acquired results are important but re-introduction of cembra pine and restoration its association with dwarf pine and spruce in Pietrosul Mountain was of major importance.
- Creation of the Rodnei Mountains National Park that facilitated a good protection and conservation of all plants and animals is as important as the previously mentioned action.