

Miroslav Benko

Croatian Forest Research Institute Vilka Novaka 50c, 42000 Varaždin Croatia Marta Curman FOPER Master student Saša Danon

Croatian Forest Research Institute Regional office for SEE Europe (EFISEE) Vilka Novaka 50c 42000 Varaždin Croatia

Abstract

Background and purpose: Nowadays, when the environmental protection is increasingly gaining in importance, initiation such as conversion of productive forest with primary economic functions into forests with special purpose should be positively welcomed. FOPER forest near Varaždin is an example of this kind of conversion. FOPER Forest is one of the outcomes of FOPER Project which was established on the area of South East Europe. FOPER Forest is located on the area of 3.60 ha of the Management Unit "Zelendvor". On one half of that area Research forest was planted, while on the other half Memorial Park will be planted in spring 2013. Overall aims of FOPER Forest is to acquire habits of people who are living in urban areas to visit green areas; to raise their environmental awareness and to strengthen cooperation in education and research; but even more important is strengthening cooperation and friendship in South East Europe (SEE). Specific aim of FOPER Forest is visitors' education about vegetation of FOPER Project countries in Memorial park and conducting researches in Research part.

<u>Material and methods:</u> Two main methods were used to gather the material on FOPER Project and on FOPER Forest: (I) published literature was reviewed, (II) the Internet and relevant web sites provided access to other information.

<u>Discussion and conclusion:</u> Good promotions of FOPER Forest can attract potential tourists and visitors and raise not only their environmental awareness, but also their awareness of importance of forestry as profession. They could see that forestry is not narrow profession which deals only with management of forests, but a complex scientific profession, which deals with variety of different fields. FOPER Forest is the great example of the overall guiding principle of FOPER Project which is "learning by doing".

<u>Keywords:</u> FOPER Forest, conversion, forest with special purpose, FOPER Project, Memorial part, Research part

INTRODUCTION

In 2004 European Forest Institute (EFI) established a project called Forest Policy and Economics Education and Research (FOPER) on the area of South East Europe, whose research results may contribute to improved legislation, policy, management, and relationships amongst the forestry sector [1, 2]. It is a project which aimed at strengthening the capacity of education, training and research [2, 3], but those were not the only outcomes of this project. In this project hundreds of people from different countries were involved, who developed, during their work on the same goal, cooperation and new friendships for life. In the name of all these great appearances which are result of FOPER, the idea of FOPER Forest spontaneously arose. In the literature we didn't find anything similar and for now FOPER forest is a unique project. FOPER Forest will be a mixture of education, research and pleasure. On one side of FOPER Forest will be Research part which will symbolize primary goals of FOPER and on which researches will be conducted. On the second part of FOPER Forest will be Memorial part (park), which will with its horticultural beautification symbolize cooperation and the friendships, which has arisen during last 8 years among the people from different countries which were involved in FOPER Project. Organized planting of trees for research part already caused a public and media interest.

Professional paper

MATERIALS AND METHODS

Two main methods were used to gather the material on FOPER Project and on FOPER Forest:

- 1) Published literature was reviewed,
- 2) The Internet and relevant web sites provided access to needed information.

DESCRIPTION OF FOPER FOREST

FOPER Forest is established near Varaždin, baroque town in north-west Croatia, in which was a base for faculty researchers and students to meet, study, write and hold seminars. Location of FOPER Forest is in Zelendvor which is located in a spacious Drava valley, in Petrijanec, only 15 km west of Varaždin. The area on which FOPER Forest is established is area which belongs to "Hrvatske šume "Ltd., public enterprise for forest and woodland management in the Republic of Croatia, which is the main source of funds for the whole project. In order to establish FOPER Forest, "Hrvatske šume "Ltd. converted part of their production forests into a forests with special purpose. They also made a Management Program which will be the basis for outstanding audit of Management Plan of management unit "Zelendvor". Location of FOPER Forest is on a part of the management unit "Zelendvor", with total area of 336.89 ha, of which 312.93



FIGURE 1 Floor plan of Research part

ha is covered with forest land. FOPER Forest will be located on area of 3.60 hectares and has altitude of 187 meters with flat terrain exposition and distric cambisol type of soil [4].

FOPER Forest will be fenced along its entire length in order to protect it from wild game and it is divided in two different parts; Research part and Memorial part (park), with two different purposes.

1. Research Part

Research Part, as one part of FOPER Forest, is located on management unit Zelendvor on parts of compartments 13c and 13d on the area of approximately 2.0 ha of total 3.60 ha. It is established on the previous black locust (*Robinia pseudoacacia* L.) stand. New stand is biologically reproduced according to the principles of Forest Stewardship Council (FSC) standards with native tree species, since all Croatian state owned forests are FSC certified. If protection from pests or other diseases will be needed, environmentally friendly non-chemical methods will be used, so usage of chemical pesticides will tried to be avoided.

In Research part different kinds of monitoring and economical and ecological researches are predicted. Expected results of Research part are: testing a new technology, analyzing profitability of the new technology, visitors' education and collecting soil, hydrological and climate data of the area. All the collected data will be stored in database specially made for this purpose.

On that part of FOPER Forest are planted 3412 seedlings of penduculate (*Quercus robur* L.) and sessile (*Quercus petraea* Liebl.) oaks, in approximately same share. The field trial was set in random four blocks design in three repetitions (Figure 1). Of total 3412 seedlings, 1107 were planted in tubes with spacing 3×3 m and 2305 were planted without the tubes, with spacing 2×2 m. Every planted tree has its own number and until now data on their height and powdery mildew attack assessment were taken. Timeline (Figure 2) shows the detail plan on measurements in period from 2012 till 2057. The aim is to compare rate of growth using two different planting methods, with and without tubes and to compare which one of those two planting methods is more profitable, in regard with number of planted trees and costs of tendering. In this part of FOPER Forest are two soil pits, due to the variability of soils on that area, and it is taken a soil auger sample.

Other instruments which will be implemented in order to collect data are lysimeters, meteorological weather station, piezometer and hunters' watchtower. They will be located beside a path which makes a border between Research and Memorial part, on which billboards with description of instruments will be situated. In order to get hydrological data, periodically taken samples from lysimeters will be analyzed in laboratories of Croatian Forest Research Institute. Solar powered automatic weather station will measure temperature of air (on the ground and on 2 m) and soil (in the root zone), relative humidity and the amount of liquid precipitation with pluviometer. It contains software which directly transfers all the data to the Research Center for Urban and Private Forests in Varaždin, which is a department of Croatian Forest Institute. Due to the diversity of terrain and variability of groundwater piezometer will be installed. Hunters' watchtower will be situated to monitor the development of treetops.

2. Memorial Part (Park)

Memorial Part (Park), as second part of FOPER Forest, will be located in management unit Zelendvor on some parts of a compartments 13 d and 13c with area of approximately 1.6 ha of total 3.60 ha. Memorial part of FOPER Forest is predicted for planting trees and shrubs but overall aim of Memorial part is to ensure place for citizen to visit it in their free time and as



FIGURE 2 Timeline on trees' measurement in the period from 2012. till 2057.

a place for education of pupils and students. Expected results of Memorial Part-Park are: raising visitors' (tourists') ecological awareness, landscape beautification, increasing the number of visitors (tourists) and improvement of cooperation between Finland and South East Europe.

Planting of Memorial part (Park) is predicted on spring 2013 after the terrain will be prepared. Terrain preparation includes removing of Black Locust' roots on autumn 2012.

Regarding conceptual design (Figure 3), the park is divided into cells which will link thematic units with associated flora.

Cells will be perpendicular to the main alley, each separated by paths or roads. Trails in the park would have to retain the naturalness by mowing. In the park trees and shrubs that occur in the lowland and mountain Croatia will be planted, as well as trees and shrubs from partner countries. Planting trees and shrubs will be performed in a way that they simulate the natural composition of plant communities, with aspiration that the rare species will be equally represented as the main species.

Groups of trees and shrubs will be crisscrossed with the meadows. Next to the species of trees and shrubs the nametags with their name will be set, while billboards with their description will be close to the paths.

Total 122 of trees will be planted in the park at intervals of about 4x5 m (depending on type), and 148 shrubs should fill spaces between the trees. It is desirable that trees and shrubs will be plant in groups and individually. The complete list of names and numbers of tree and shrub species are in table (Table 1).

Aim of the project

Beside economic functions to provide us with wood and wood products, forests have social and ecological functions. As society becomes increasingly concerned about the negative impacts of climate change, loss of biodiversity and declining supplies of water; those functions are increasingly gaining in importance. Except raising ecological awareness of individuals, it is very important to create and implement proper politics which will try to prevent those negative impacts. FOPER Forest is a good example in which one part of economical forest will be converted into park and research forest. It has also a great value, due to the vicinity of Educational Path, which with one part passes along northern and northeastern edge of FOP-ER Forest. The aim of Educational Path is education of primary school pupils about flora and fauna of the immediate environment of their homes. That is going

TABLE 1	
List of names and numbers of tree and shrub :	species

Trees		Shrubs	
Name	Num- ber	Name	Num- ber
Abies alba Mill.	6	Cornus mas L.	14
Acer pseudo- platanus L.	2	Cornus sanginuea L.	19
Acer platanoides L.	20	Corylus avellana L.	3
Alnus glutinosa L.	4	Crataegus monogyna L.	3
Betula pendula L.	4	Crataegus oxyacantha L.	13
Carpinus betulus L.	5	Euonymus europaea L.	4
Fagus sylvatica L.	4	Genista tinctoria L.	8
Fraxinus angusti- folia L.	3	Ligustrum vulgare L.	8
Fraxinus ornus L.	3	Prunus spinosa L.	16
Juglans nigra L.	3	Rosa canina L.	12
Picea abies L.	5	Rubus idaeus L.	3
Picea omorika Pančić	9	Ruscus aculeatus L.	8
<i>Pinus nigra</i> Arnold	7	Ruscus hypoglossum L.	2
Populus alba L.	3	Salix caprea L.	3
Populus nigra L.	2	Sambucus nigra L.	6
Prunus avium L.	5	Staphilea pinnata L.	11
Pseudotsuga menziesii Franco	5	Taxus baccata L.	5
Quercus cerris L.	4	Viburnum opulus L.	6
<i>Quercus petrea</i> Liebl.	5	Vinca minor L.	4
Quercus robur L.	7		
Salix alba L.	3		
Sorbus aucuparia L.	3		
Sorbus torminalis Crantz	4		
Tilia tomentosa Moench	3		
Ulmus laevis Pall.	3		
TOTAL	122		148





to be great supplement to FOPER Forest, due to the existence of information about local wild game, which on one side enriches biodiversity of that area, but on the other represents a possible threat to seedlings of FOPER Forest, because it is not fenced yet.

Overall aims of FOPER Forest is to acquire habits of people who are living in urban areas to visit green areas (park forest) during their free time, and to raise their environmental awareness of the social functions of forests, and strengthening cooperation in education and research, but more important is strengthening cooperation and friendship in South East Europe (SEE). Here lies the value of this project due to the conflicts and political tenses in nearly past in SEE region.

Specific aim of FOPER Forest is visitors' education about vegetation of FOPER Project countries in Memorial park and conducting of research in Research part.

DISCUSSION AND CONCLUSION

The fact that organized planting of trees for Research part already caused a public and media interest, it can be assumed that this is a good basis for achieving overall aims of FOPER Forest. Good promotions like that can attract potential tourists and visitors and raise not only their environmental awareness, but also their awareness of importance of forestry as profession. By visiting FOPER Forest they could see that forestry is not only narrow profession which deals only with management of forests, but a complex scientific profession, which is dealing with variety of different fields.

FOPER Forest is not only made for beautification of the area and as a memorial part for FOPER Project, which mostly aims Memorial part; it is also made to get exact calculations on which planting method is more profitable, which partly aims Research part. Century long future researches conducting, which impose Research part, in a way guaranty a future cooperation and friendships not only in Croatia, but also in South East Europe if FOPER Project will be continued in future.

FOPER Forest is the great example of the overall guiding principle of FOPER Project which is "learning by doing".

Acknowledgments

The authors would like to thank to Prof. Dr. Margaret Shannon, to M.Sc. Marko Lovrić and to M.Sc. Nataša Lovrić for their help and suggestions.

REFERENCES

- FOPER 2006 FOPER International Master's Program (MSc) in Forest Policy and Economics (FPE), Faculty of Forestry in Belgrade, Faculty of Forestry in Sarajevo
- CONSOLIDATION OF THE HUMAN CAPACITIES IN FOREST POLICY AND ECONOMICS EDUCATION AND RESEARCH IN SOUTH-EAST EUROPE AND WESTERN BALKANS 2010. Available at: http://www.foper.org/download/publications/FOPER%202009%20-%202010.pdf (Accessed: 15 June 2012)
- FOPER 2012. Available at: http://www.foper.org/ (A cessed: 15 June 2012)
- 4. CROATIAN FORESTS LTD. 2006 Management plan of Unit "Zelendvor",