

DOCTORAL (PhD) THESIS

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**PUBLIC WELFARE SERVICES OF HUNGARIAN
STATE FOREST HOLDINGS AND THEIR EFFECTS**

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1. BACKGROUND OF THE STUDY

Both at international and national levels besides its social, (national) economic and protective function public welfare function of the forest plays a more and more important role. This process in Europe—especially in countries with low forest cover—resulted in an increase of recreational and aesthetic function according to social expectations. Proper environmental conditions affect positively the health and mental status of the population. Forests—without overstatement—are essential for physical and mental health, especially in densely populated European countries, society supports an increasing need for staying there in during holidays. Besides the traditional walking tourism (hiking) a new demand appeared for cycling in forests in the last decade.

Society—partly due to its heterogeneity—has a wide variety of common care needs, these needs with specific, and well or less well established mechanisms become concrete programs or projects. In the last years demand for public welfare facilities of forestries dramatically increased, with their public welfare activity they try to serve the needs of “civil consumers”.

Wood is the renewable raw material that can be produced in the largest quantities. In more than 51% of national forest holdings agricultural activity is also present. Public welfare improvements of the forest are especially important because licensing authority sites mainly belong to the Ministry of Rural Development including the National Food Chain Safety Authority in the government. National forest holdings play an

important role in rural development contributing to the rural development strategy of the government.

In my thesis I aimed the presentation of the economic effects of public welfare services at national forest holdings. While financial evaluation may seem to be natural—in the literature—no one tried it. There is no referenced, comprehensive study about public welfare services offered by national forest holdings, such as the forest schools, their structure was necessary to examine in my research. Growing forest is for sale or buy, but the value of the forest is not, or not just an economic category.

The main aim of my thesis is to contribute the approach that in the expend of public funds the only aspect would not be the simply measured monetary efficiency.

2. AIMS OF THE DISSERTATION

There is an economic assumption that the resources are available evenly. In contrast, social needs and demands continuously changed (expanded) in the course of time. The role of the state in the regulation of market is a constantly recurring issue. The role of the state in developed market economy is essential.

In order to promote sustainable economic growth and social development, economic programmes and the maintenance of institutions require serious resources. The extensive global market processes, catalyzed by globalization, need constant source deduction, constriction from state organizations. As a result, the public welfare expenditures are reduced, a growing problem is the issue of financing public goods and public services.

Application of cost-benefit analysis in this area means a scientifically innovative aspect of the topic.

In this diverse area, it is essential to establish

- a)* the assessment of the capacity of the accommodations owned by the 22 state forestry and the analysis of various aspects to improve competitiveness and the annual utilization; and
- b)* to chart and analyze in various aspects of forest schools owned by state forestry.

We aimed to determine that the forest area size is affecting the life expectancy at birth and if it is true, how much affects it in each country.

2.1. Hypotheses

- H1.** Benefits of the public welfare function of forest occurring in the whole society exceeded the financial expenses of state forestry, so the public welfare utilization of the forest is necessary—even against our own results.
- H2.** The temporal coordination of the functions of state forestry owned accommodations strengthens the public welfare and other (spare time) functions, increasing utilization and has a positive effect on efficiency.
- H3.** Participants decide according to equipment and the offered programs among forest schools, so these factors can influence greatly the education of environmental awareness, healthy lifestyle and identity.
- H4.** With appropriate marketing activities and utilization of synergies of state owned joint-stock companies (22 state forest holdings and the Hungarian Tourism Plc.) the utilization of narrow gauge railway can be increased which results in reduction of maintenance losses.
- H5.** Maintenance of sacred places (memorial places, shrines), community and faith have an unquestionable social value; at the same time utility of awareness with additional costs comparable with the costs of media campaigns that have similar results.

3. MATERIALS AND METHODS

To determine the critical variables factors have to be counted, that have direct or indirect effects on financial and economic cost-benefit indicators.

Direct effective factors are determined by many independent factors. Some of them influence only one direct factor—independently from the others, the other factors influence more direct effective factors at the same time, therefore they have complex effects on performance indicators.

According to the most important effective factors to detect the critical variables at the first step we have to analyze the direct effective factors. If the direct effective factor does not reaches the critical variable level (1% change does not influence the performance indicators more than 5%), those indirect factors do not need further analyzes that influence only this factor, and have no effects on other indirect factors.

Indirect factors that influence more direct and indirect factors have to be analyzed separately. These factors do not have to be quantified in the sensitivity analysis, but in risk analysis, the analysis of the most important factor is reasonable.

In every case we mention the state forest holdings we mean the 22 national state forest holdings (Hungarian Development Bank Plc.). We performed our research in accommodations, forest schools, narrow gauge forest railways, and a pilgrimage place owned by state forest holdings, in 2011-2012. Some parts of the data—due to its nature—referred to 2010.

Data was processed with SPSS and MS Excel software.

Analysis of forest accommodations: we analyzed the 83 accommodations owned by state forest holdings with the help of a form—based on a survey from 2010, particularly focused on the capacity of hunting lodges, but we also analyzed other types of accommodations. An important part of determination of process characteristics is the determination of process capacity. Capacity refers to the amount of work that can maintain one service unit in a certain time unit. The index of capacity always some kind of a rate: in the numerator of the rate there is the available or planned performance in a specified time unit determined by the denominator. To measure capacity several approaches are well known. In some cases, it is very difficult to measure the actual capacity therefore not only a single capacity metrics indicator is used. The number of beds is an input index; number of the guests is an output index. Efficiency is counted from the ratio of output/input. The 22 state forest holdings are the 100% of the national state owned forest holdings.

Survey of the forest schools: the directors of the twenty-seven forest schools (chief executive officer, director of the forest school, etc.) filled out our self made questionnaire—contained 31 questions—in the summer of 2011. Most of the questions were closed, a few was open.

Survey of narrow gauge forest railway: In Hungary, eleven narrow gauge forest railways are actuated in the area of state owned forests, we introduce the public welfare activity of them according to their unique campaign and the new services and improvements and their improved results from the past 18 months.

Forest monuments, pilgrimage and sacred places: public welfare investment presentation in a case study. We studied the multiplier impact that follows the performance of public welfare tasks of a state

owned company at a given area/city, on the reputation and touristic attraction of a pilgrimage place.

Permission of the research: The study covered the whole area of the national state owned forest holdings (n=22, 100%), it was conducted with the approval and sponsorship of the management of Hungarian Development Bank Plc. who is the legal practice owner.

4. RESULTS AND DISCUSSIONS

4.1. Public welfare role of forest accommodations

National forest holdings provided 1490 beds in 598 rooms and 14 separate houses in eighty-three accommodations in 2010. These establishments could be categorized into nine groups: the largest proportion of accommodations (71.1%) were hunting lodges, in addition we can highlight the highest proportion of pensions (8.4%) and the guest houses (6.0%). Most of these accommodations are qualified: 35.6% II. class, 23.7% I. class. 72.5% of the accommodations offered rooms for visitors during the whole year, 21.3% of them were opened seasonally. The price of single rooms changed in a wide range—from 2110 HUF to 20,000 HUF—an average range between 6300-9000 HUF. We found the double room prices between 2100 and 33,000 HUF.

The average utility of accommodations owned by national forest holdings—typical of this business unit—shows a large seasonal variation, so it was 13.3% in July and 2.7% in December, in 2010. Utility was better than average from May to September, but it was under 5% from October to March. The average utility was 5.2% through the year in 2010, the weighted average utility was 6.6%, so the degree of resource utilization (achieved output)/(proposed capacity)=6.6.

The extent of tourism mostly can be characterized with overnight stays, as the revenues can be realized by the sector are directly proportional to the days spent there. The order of the accommodations was determined depending on capacity, the order of guest-nights was determined by the spent guest-nights. With the Spearman's correlation

coefficient—from the indicators of forest accommodations—the relationship of capacity and guest-nights was analyzed, its value $r_s=0.47$ (with 22% explained variance). According to these two sets of data we can say that the relationship between them is moderately close. To analyze the same at the national forest holdings the value of Spearman's coefficient ($r_s=0.77$) suggests that the relationship between these two sets of data is very close and significant ($p<0.05$). We state that capacity plays a major role in the use of the accommodations of national forest holdings.

Lots of data were available for further analysis of utility. Considering the heterogeneity of the number and utility of accommodations separate analysis of hunting lodges were reasonable. We modelled the prognosis of the utility of hunting lodges with decision tree algorithm. The first cut point was geographic area: utility of hunting lodges in Northern Hungary is higher (7.1%) than in the eastern or western parts. The most important criterion was the opening hours in the case of Northern Hungarian hunting lodges. Hunting lodges that were open during the whole year reached an average 14.5% utility, while it was 2.9% in lodges that were open seasonally. In Western Hungary the most important criterion is the type of service. If there are at least six preferred services, the utility exceeded 10%. In the Central and Eastern Hungarian regions hunting lodges the cut point was the price of the double rooms: where it exceeds 8000 HUF the number of the visitors is very low (0.7%).

4.2. Public welfare role of forest schools

National forest holdings operated 27 forest schools in 2011. This network of forest schools accommodated and offered the nature close education for 157,652 people between 2006 and 2009. In forest schools operated by national forest holdings—if only consider the capacity of space for

sessions—it can provide place for 7050 participants at the same time. If we consider that one day programs are available in every forest school, it is clear that forest schools provide services—learning, training and recreation—for a huge number of participants.

The capacity of the sixteen forest schools with accommodations varied between 53±44, capacity varied between wide range: at the forest school with the “lowest” capacity it was six, while the “largest” could accommodate 150 students. Considering all types of accommodations the total capacity was 1637 per nights at the forest schools. Besides the indicators of forest schools we used Spearman’s correlation coefficient to analyze the relationship between capacity and guest-nights: it was $r_s=0,90$ with the data of 2010 and $r_s=0,85$ in 2011. We can say that with the analysis of these two sets of data relationship between them was strong and significant ($p<0.05$). At forest schools from ten participants four were elementary school students and three were from upper school in 2010. Small proportion of adults was present showing that there is a huge reserve in the increase of youth’s, adolescents’ and families’ participation.

With further analysis of utilization data our aim was to build a predictive model we could use to predict annual utility. We used a data table that contained 211 variables. For the statistical analysis of our basic question we used linear regression. The average utility was 64.2% in our sample it varied between 20 and 100%. The strength of our model—because of the small sample size—is not significant, but it is definitely suitable to define basic tendencies. According to our assumption with a larger sample size a more stable model could be made. Diagnostic parameters of the model are good. Correlation between the actual and estimated utility is 0.76, explained variance 57.8%. With this built linear regression model we can predict the utility of forest schools with the

knowledge of some parameters (transport, food price, age group ratio of previous/expected guests).

4.3. Public welfare role of narrow gauge forest railways

Positive changes took effect that affected narrow gauge forest railways owned by forestries: where it was reasonable schedules were introduced and connected the arrivals and departures to MÁV and Volán schedules.

In order to get more people to know, visit and like narrow gauge forest railways the Hungarian Development Bank—owner of national forest holdings—with the help of Hungarian Tourism Plc. and the cooperation of almost all narrow gauge railways started the “*Kisvasútra fel!—Up to narrow gauge train!*” programmes. For younger children there were playhouses, for school children there were take part quiz games, older children in photo competition. The program was very successful: in the quiz game 800 classes (approximately twenty thousand) participated from the whole country, the number of participants of the photo competition were more than five thousand. Alone—on the basis of feedback—participation in the photo competition was not so attractive, but the programmes achieved its goals, it made interesting the narrow gauge railways for a wide audience.

National forest holdings contributed with 3.8 billion HUF public welfare developments from their own and sponsorship sources to achieve this conception.

These actions had positive effects on the service of narrow gauge railways. In 2011 there were 32% more passengers than in 2010, incomes increased with 49%. This increase continued in the first half of 2012, number of passengers increased with 4.5% and the incomes increased with 5.5%.

4.4. A case study of the multiplier effects of Szentkút-Kálvária investment in Vasvár and make a “social satellite account”

On 16th September 2012 the 50 million HUF investment of the Szombathely Forestry Plc. was opened on a ceremony that aimed the rehabilitation, lightning up of hundreds of years old pilgrimage place, Szentkút–Kálvária shrine and the creation of a thematic pathways in the area of Vasvár. The rehabilitation and restoration of ST. MARY shrine owned by the Szombathely Forest Plc. is implemented as a public welfare task.

We studied the possible expenditures for the town with the news reports, press releases, reports and the undetected but most effective “oral propaganda”, so the concrete signage in case of the finished project. These “virtual” charges were faced to the fact that the journalists, commentators wrote about the ceremony free of charge.

Purchases on tariff rate corresponding to demand market PR advertising in county newspapers, and banner design in their websites would ment almost 9.5 million HUF that is equal to 20% of the whole investment. Not counting on “credibility rate” of paid advertising and the editorial report, so with the fact that an editorial report about the opening of the shrine is more subjective and more credible, it really enticing and motivating than an evidence based advertisment with the photo and the opening hours of the shrine with many advertisements on the same page. If the reader according to this goes to Vasvár, a 20% relative return shows a better rate, because the guesstes will eat, do shopping and optimally stay at a commercial accommodation resultin in a significant tax revenue to Vasvár.

If the segment corresponding wavelength radio spots besides the advertisements of county journals can invite visitors to the area, about another 5 million expenditure could be calculated. Projecting the efficacy rate to the total investment without measuring achievement it could mean further 10 per cent additional cost, opposite to the invitations of radio reporters and possible live broadcasts. If the town or the maintainer national forest holding instead of or in addition to the investment started a public art billboard campaign for a month about approximately forty places, a further 20 million HUF additional expenditure should be reported. Obviously it does not make sense alone: for 40% of the cost of the investments, posters that can be seen for a shorter period of time can draw attention to the object less than a well organized pilgrimage night, concert or religious event.

It can be clearly state that the costs of smaller campaigns that cannot be states as seasonal, covers the costs of public welfare investments of national forest holdings that are more timeless, efficient and meaningful solution than the advertisements of the town/tourist object. Beyond the issue of media buying vs. investment the finished investment results in an undetectable and unpredictable “social satellite account” revenue, it improves the wellbeing, strengthen happiness index, increase rural rateing capacity, consolidate the local civic values. In addition it creates real jobs.

4.5. The effects of forest cover on life expectancy at birth

Our aim was to determine that which factors related to the life expectancy according to analyzing the macro-indicators of thirty different countries. The available indicators: Per capita GDP [USD], the population of the country [n], the rate of forest cover [%] and the Human Development Index (HDI).

Our assumption was that the ratio of forest area—in some way—is in relation to life expectancy at birth. We concluded according to the analysis of the direct assumption (fitting the regression line) that there is a relationship between the two variables, but this is weak if we assume the linear relationship. Subsequently we carried out various transformations about the extent of forest cover and analyzed the relationships. After more tests we found that the relation is described best with the reciprocal value. Between the target variables and the reciprocal forest cover we found a correlation higher than 0.5. In the next step we analyzed the possible effects of further variables and the results were fitted to linear regression model. As a result we obtained a formula where we could explain 43% of the explained target variables with the help of the two variables. The used variables the reciprocal forest ratio and the HDI, where the reciprocal forest ratio is the negative beta value in our equation. Based on this we can say that with the increase of forest ratio the life expectancy at birth is higher. We experienced similar results in case of the HDI, higher HDI related to higher life expectancy.

The effects of forest cover on life expectancy at birth shows evidence in other analysis as well. Besides the known relationship between GDP and life expectancy at birth, the forest cover could be also remarkable. In the first sixteen countries according to GDP with the decrease of forest cover life expectancy at birth also decreased. However we could not found these trends in “normal” or “poorer” countries. The same can be said in case when the average life expectancy at birth was ranked in range of GDP expenditure for health care.

According to the per capita GDP in the ten richest countries (Luxembourg, Norway, Switzerland, United Arab Emirates, Denmark, Australia, Sweden, the Netherlands, United States, Ireland) this

phenomenon can be observed even more pronounced. In those countries where—compared to others—the per capita GDP is higher, forest cover has a positive effect on life expectancy at birth. They live longer with an average 1.4 year.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. The increase of public welfare role of forest accommodations

It can be said that most of the accommodations are high quality, high standard; despite of this can read critics in the literature, as such: “In case of hunting the problem is caused by the poor conditions of the lodges and the low quality of the related services (hunting shops, restaurants, etc.)” According to the summarization the accommodations and the rooms are simple but high standard. The average annual utilization (6.6%) is very low according to the accommodations. (To demonstrate it we highlight only one issue: in 2010, the highest utilization we found among forest accommodations was at “Júlia úti Vendégház és Vadászház” owned by the “TAEG Tanulmányi Erdőgazdaság Zrt.”, with 37.3 %.) All the hunting lodges as well as other similar accommodations have a high dead capacity. A smaller part of them could not be necessarily used as quality accommodations, they could be used as hostels or youth hostels. Competitiveness could be increased with programme opportunities, concrete programmes, and special offers—also available in foreign languages.

- Modern, all needs satisfying accommodations are essential to reduce seasonality that establishes the economic run of the accommodations, waiting for development. (Lower seasonality is a factor that increases the profit alone.)
- To achieve longer stay guests, alternative programs, hiking and other free-time activities are required.

Establishment and expansion of public welfare programmes are opportunities to reduce seasonality and increase the length of stays. In the development of public welfare facilities we should aim to achieve complex goals, and leisure center like designs. Because appropriate utilization and appropriate number of visitors are needed to introduce of the forests for a wider social classes. Although there are services (for e.g. hunting) that can guarantee the international quality tourism, during the development of public welfare facilities we have to consider many other parameters and circumstances. Subregions that can offer programmes or attractions near the accommodations owned by national forest holdings can also profit from the development.

5.2. Increase the public welfare role of forest schools

During the last six years (since 2006) more than a quarter million people (n=261,193) mainly students visited forest schools owned by national forest holdings. The average utilization of forest schools was 56.5% in 2010 and 66.4% in 2011: the degree of resource utilization increased with ten per cent (9.8%) over one year.

In our analysis we recognized that there is a close connection between capacity and utilization. Presumably, during the organization of programmes forest schools with higher capacity are preferred, while good accessibility (public transport)—besides the price—is also an important factor. The model we set up to analyze utilization shows that utilization is influenced preliminary by the price and the accessibility for the present situation we have to reject it. According to the economic situation of the forest schools and the students unfortunately it is not surprising that student groups have to prefer cheaper accommodations and forest schools instead of better equipped ones.

Change in approach forest schools helps—among other things—to understand and manage global problems, the environmental thinking and lifestyle of people. It is possible that the equipments and the offered programmes influence environmental awareness, healthy lifestyle and the education of identity awareness, but the preference aspect of them is lower than the expected. May be the better equipped forest schools more efficiently but these school groups are less preferred.

Our recommendations according to the rejection of the 3rd hypothesis:

- well equipped schools with offers of many programmes have to be made more attractive to the users with better accessibility or lower prices;
- Equipments and program offers have to be expanded at forest schools with cheaper prices and better accessibility to achieve a better impact on environmental awareness, healthy lifestyle and education of identity awareness.

5.3. Increase the public welfare role of narrow gauge forest railways

The achieved and presented results do not mean that the financial situation of forest railways is stable. Although the loss was reduced during the past year, only the necessary expenses are covered by the incomes of the railway of Szilvássvárad. In other cases foundings form other maintainers also needed.

Forest railways cannot be placed on business base, it cannot be expected to operate profitably so state has to play a strong and long-term role. In the future we have to separate the operation from maintenance in supporting. The public financing of operation is solicitous according to the concern of the European Union, at the same time for maintenance,

conditioning, resurrection and investments sources of the nation and the union can be used.

It is a serious problem that except for the Northern Hungarian region, forestries could not obtain sources from the EU for the development of narrow gauge trains.

5.4. Increase the public welfare role of sacred places

Pilgrimages with thousand year history offer excellent opportunities to develop cultural ways—where the sacred places are the targets of the road stages. In the touristic utilization and development the followings have to be considered:

- The strong cross-border nature of shrines.
- They strongly link to each other, the possibility of developing them together.
- Take into target groups beyond pilgrimage groups.
- Proposed development trends, specific projects.

One of the main proposed directions of development is the road, promotion of each stages and co-marketing. Of course it is important and necessary to develop a common identity and informational content, and online publishing as well.

Take into account national and international opportunities to make networks (for e.g. register the shrine into the pilgrimage network, for e.g. MÁRIA-út) the indirectly produced urban incomes by the investment—to strengthen the microregional economy—further can be increase. During the creation of specific projects we have to consider priority to the fact that several shrines directed cross-border in reality—for e.g. Spring Miród—while in the other cases strong cross-border relation can be also shown.

5.5. Benefits of public welfare services of forest in various economic fields

One of the important results of my dissertation is to prove that we found a relationship that point towards the truth of the hypothesis: the extension of life expectancy at birth has invaluable benefits for the whole society. So far not sufficiently proven—especially due to the overwhelming effects of GDP per capita—the role of forest in health and life expectancy at birth, but in the richest countries life expectancy increased with the increase of the proportion of the forests.

Over ten years ago attempts have been made to describe the relationships between life expectancy at birth: at that time twenty-seven indicators were tested, at the final analysis nine were found to be significant. One of them was the proportion of forest that according to the results showed a weak negative correlation with life expectancy at birth.

We can explain our differing result with the increased role of recreation during the last ten year, countries with high GDP production can spend more for recreation. They use parallel the forests for recreation and medical purposes with the economic increase of the country so we found these results in the richest countries. Further research is needed, but the result of the analysis of the richest countries gives a chance to prove our first hypothesis.

The following issues are effects that related to the utilization of forests and make it possible to achieve extra yield.

- As a result of the operation of forest schools these institutions—like the public education institutions—can effectively operate, as a result of education students' (citizens') awareness could reach a level with the remaining development and environmental and nature protection could became more effective.

- Through environmental protection (decrease littering, etc.) as a result of the transport of less trash represents a direct cost but—in short and long term—direct return can be expected.
- Open air exercising (for e.g. hiking, cycling in the forest) will result in lower health care costs.
- Visiting sacred places resulting in reduced social costs.
- The growth of public services produced by community will increase (for e.g. painting tourist signs in social work).
- Great opportunities are available for the development of services offered by forest holdings. As in other sectors of tourism, in forest tourism innovations develop and spread rapidly.

Role of the government in public welfare investments—in principle—depends on how it can consider as public or private good. So far (as referenced in the literature) there was no phrasing the important external yields linked to the forest.

On this basis some degree of state investment to forestries may be reasonable, but the appropriate form and level of the role is a very controversial issue. This role does not mean just public financing but also private services. State is not just financing the operation of state forest holdings but most of them are created by the state. Most of the public welfare investments do not work market efficiently. With the conditions that available for them, they are “managed” not on the basis of economic rationality that can be defined in market integration.

HIRSCHMAN emphasizes that “the supply of most public services is not exposed to the »market lows«, problems with production efficiency and quality maintenance occurs inevitably”, but nowadays it becomes less and less true in public welfare services.

6. NEW SCIENTIFIC RESULTS

1. Public welfare activity of state forest holdings is unprofitable (0,8 billion HUF in 2011) but due to the increasing social demands and expectations public companies do not aside from the providing this task. The state provides satisfaction of social needs, through in 100% state owned forest holdings that have invaluable benefits, although we tried it in my dissertation but it is just difficult to determine. We did a major step to statistically prove the 1st hypothesis: the use of forests for recreational purpose is shown to increase life expectancy.
2. In the accommodations owned by state forest holdings more free time activities increase utilization, but the strongest influencing factor we identified was the price of the room. We could prove the 2nd hypothesis partly.
3. In relation to of the 3rd hypothesis I proved that forest schools have large free capacity. Guests have to prefer the cheaper accommodations and forest schools with favorable price instead of the better equipped, thus forest schools with high personal and material facilities do not reach their goals of environmental awareness, healthy lifestyle and identity awareness education. It is reasonable to reject this hypothesis.

4. With appropriate marketing activities and exploiting synergies between state forestries and the Hungarian Tourism Plc. the utilization of narrow gauge railways can be increased greatly. Beside maintainer financing this would be such an extent that revenues could cover fully the expenses.

5. Expenses to sacred sites (memorials, shrines) related to the additional conscience shaping utility is comparable to the costs of media campaigns with similar results.

7. SUMMARY

Forest management plays a diverse role in the life of the state and the society (individual). The forest provides material goods and services, and the sustainable utilization of protection and public welfare functions are irreplaceable and cannot be dispensed in the national economy. Value of the forest cannot be expressed either in money or in numbers, however the society have to see the different profits of the expanding forests—including timber production, forest products, game, environmental awareness, educational role in identity, sports, hiking—as well as health benefits. In many cases during the allocation of scarce resources such decisions have to be made when some of the public welfare provisions are supported while another project, facility, etc. is not supported.

The state provides satisfaction of social needs, through in 100% state owned forestries that can be determined with difficulty. Recreational role of natural environment is becoming more and more important. The health and psychological state of the individual and the society positively affected by the forest, helping to reduce health care costs, due to the better workload it causes the the increase of gross domestic product (GDP), overall the “richness” of the country.

From the public welfare profits of the forests, different economic sectors gain, so tourism, transport etc. acquire revenues. For example the environmental education in forest schools allows—among other benefits—the positive shaping of the approach of the future generation.

In fact, not the definition of public good is interesting, but who, what and when decides these questions. It is possible that they cannot exactly say what is meant by sustainability or public good, but they exactly know

what it is not. They are such goods or/and values that protection and production seems to be the task of the state or a task close to the government. The society mainly adjudges the forest management activities of the state through public welfare activities.

We demonstrated that forest schools have significant free capacity. With appropriate provisions of (for eg. expansion of travelling opportunities) utilization could become higher, thus their impact on education of environmental awareness, healthy lifestyle and identity awareness could be improved greatly. We successfully demonstrated that with appropriate marketing activities and utilization of various synergies the number of users could be increased significantly. We quantified usefulness of the expenses of awareness shaping function of sacred places (memorials, shrines), so we could compare it with the costs of media campaigns that cause same results. We tried to prove that more leisure-time opportunities at the accommodations of state-owned forestries increase the utilization, but the prices of the rooms were identified as a stronger influencing factor. We made a major step to prove that although the public welfare activity of state forestries is unprofitable, they have to do it. The benefits of public welfare activities of state forestries are incalculatable, for example the role in prevention, therapy and rehabilitation, or the positive effect on life expectancy at birth.

The maintenance of health requires a new approach, which create effective demand in more ways of industry produced goods and services, thus investments to health promises much higher yields than investments in any other fields. Statistically can be measured for example the forest area, the change of it, timber yield but added values cannot be measured, so the value of forest is inestimatable.

8. PUBLICATIONS AND ORAL PRESENTATIONS FROM THE THESIS STUDIES

8.1. Papers related to the thesis

8.1.1. Publications in peer-reviewed journals

1. **SEREGI, J.** – LELOVICS, ZS. – BALOGH, L.: The social welfare function of forests in the light of the theory of public goods. *BERG Working Paper Series*, 2012. 87: 1–24. **IF₂₀₁₁: 0.440**
2. **SEREGI J.** – BALOGH L. – LELOVICS Zs.: Az erdei mellékhaszonvétele szerepe az egészségvédelemben, a gyógyászatban és a közjólétben. *Studium & Practicum*, 2012. 6(10): 4–6.
3. **SEREGI J.** – LELOVICS ZS. – BALOGH L.: Az erdő gyakoribb mellékhaszonvétele termékei és közjóléti hatásuk. *Studium & Practicum*, 2013. 7(1): 7–10.
4. **SEREGI J.** – LELOVICS ZS. – BALOGH L. – PAPP L.: Az erdő egészségmegőrző szerepe. *LAM, In press.*

8.1.2. Publications in peer-reviewed proceedings

5. **SEREGI, J.** – LELOVICS, ZS. – BALOGH, L.: The improvement of the competitiveness of public welfare services and the average capacity of commercial accommodations owned by the national forest holding. [4. Nemzetközi és 10. Országos Interdiszciplináris Grastyán

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8. SEREGI J. – VARGA L. – **SEREGI J.**: Az *ex situ* állattenyésztés génmegőrzési szerepe a regionális vidékfejlesztésben. [„6. Régiók a Kárpát-medencén innen és túl” Nemzetközi Tudományos Konferencia. Kaposvár, 2012. október 12.] *Közép-Európai Közlemények (KEK)*. *In press*.

8.2. Oral presentations in international conferences

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3. **SEREGI J.** – LELOVICS ZS. – BALOGH L.: [*Effects of the expansion of the social welfare services of commercial accommodations of the national forest holding to the increase of the thrift and competitiveness*]. (In Hung.) 53rd Georgikon Scientific Conference. Keszthely/Hungary, 29–30th September 2011.
4. SEREGI J. – VARGA L. – **SEREGI J.**: Az *ex situ* állattenyésztés génmegőrzési szerepe a regionális vidékfejlesztésben. „6. Régiók a Kárpát-medencén innen és túl” Nemzetközi Tudományos Konferencia. Kaposvár, 2012. október 12.