THE ASSESSMENT OF CONTRIBUTION OF FOREST PLANT NON-WOOD PRODUCTS IN LATVIA'S NATIONAL ECONOMY

Jānis Donis[2], Inga Straupe[1]
[1]*Latvia University of Agriculture*
[2]*Latvia State Forest Research Institute 'Silava'*
janis.donis@silava.lv; inga.straupe@llu.lv

Abstract

The forests in Latvia occupy 49.9% of territory and they have significant economic, ecologic and social functions. The notion 'forest value' is frequently understood as the value of wood only but non-wood values are often neglected because there are methodological and practical difficulties to estimate them in monetary terms. The list of forest plant non-wood product (FPNWP) groups potentially important for Latvia was made and the significance of them in Latvia's national economy was estimated. To obtain the information about FPNWP in Latvia (kinds, amounts, value, own-consumption) the public opinion poll was carried out. 77% of the residents of Latvia aged 18 - 74 have gathered the nature products in Latvia in 2010. The most significant FPNWP are mushrooms, wild berries of family *Ericaceae - Vaccinium myrtillus* L., *Vaccinium vitis-idaea* L., *Oxycoccus palustris* Pers. and birch sap. The contribution of FPNWP in the Latvia's national economy in 2010 was 66.8 million LVL, including 8.9 million LVL for the products sold in the market or exchanged among households.

Key words: non-wood products, mushrooms, wild berries, birch sap.

Introduction

According to the state cadastre data of real estate on 1st January, 2010 the type of land use – forest occupies 45.8% or 2 955.5 ha of the whole territory of Latvia (State Land Service, 2010). Estimating the situation in nature, the data of the first cycle (2004 - 2008) of the national forest inventory shows that 49.9% or 3220.9 ± 23.61 ha of the state territory corresponds to the definition of forest (Latvijas meža resursu statistiskā inventarizācija, 2010). Considering the territory covered and its proportion on the land, the forest is not only an important source of wood products but it also has significant ecological and social functions.

The value of ecosystems is formed by its primary value (the ability to exist in changeable circumstances) historical, cultural and symbolic value and also its secondary value – economic value (market and non-market value). Although historic, cultural and symbolic values are included in the group of non-market values, it is pointed out particularly to emphasize its importance for the local identity and culture which is hard to evaluate fully with the general methods of neo-classical economics (Willis et al., 2000). The notion 'forest value' is frequently understood as the value of wood only (most often it is the amount of wood which could be cut and sold, rarely as the perspective value of wood stock). Sometimes it is understood as the value of forest land cadastre or market value. Other forest values – forest non-wood values (all the ecological and social values are often neglected because there are methodological and practical difficulties to estimate these values in money expression to be compared with wood and forest land value (Tuherm, 1997; Tuherm and Berņikova-Bondare, 2008).

In 2008, forest contribution to the national economy value was 187 million LVL and its value to gross domestic product (GDP) was 1.2%, but wood production branches – wood processing, paper production and furniture production contribution was 410 million LVL, making more than 2% from GDP. The forest branch has an important role in the employment of the state inhabitants – more than 5% of the employed in the national economy (Meža nozare Latvijā, 2009).

In 1999 after the decision of Food and Agriculture Organization, it is defined in Forest Resources Assessment that non-wood forest products consist of goods of biological origin other than wood, derived from forests, other woodland and trees outside forests (Wong et al., 2001). But global forest resource assessment in 2005 and 2010 used the following non-wood product definition - products gained from forests that are tangible and physical objects of biological origin other than wood (Global Forest Resources Assessment, 2010). However, Integrated Environmental and Economic Accounting groups Forest plant non-wood products (FPNWP) for personal and production use in the following way: food (berries, fruit, mushrooms, nuts, plam oil, honey etc.), medicine, animal feed and industrial extracts (cork, indian rubber, resin, tar, chemicals) (Handbook of National Accounting - Integrated Environmental and Economic Accounting, 2003). The report guidelines about the state of European forests define the categories of FPNWP: Christmas/New Year trees; mushrooms and truffles; fruit, berries, edible nuts; cork; resins, raw material- medicine, aromatic products, colorants, dyes; decorative foliage, incl. ornamental plants, mosses, etc. (Reporting on sustainable forest management, 2011).

According to the statistic classification of economic activities, NACE division 'Forestry and logging' (code 02) includes the following classes: 'Silviculture and other forestry activities' (code 02.10), 'logging' (code 02.20)

and also 'gathering of wild growing non-wood products' (code 02.30) which includes mushrooms and truffles; berries, nuts; different kinds of tar; cork; shellac and resin; balsams; plant fibers; acorn, chestnuts; moss and lichen (Saimniecisko darbību statistiskā klasifikācija, 2010). According to the statistical classification of products by activity (Preču statistiskā klasifikācija pēc saimniecības nozarēm, 2008), forest products do not include only wood materials and trees but also wild growing non-wood products (code 0.2.30): natural gums (code 02.30.1); balata, gutta-percha, guayula, chicle and similar natural gums (code 02.30.11); lac, balsams and other natural gums and resins (code 02.30.12); natural cork, raw or simply prepared (code 02.30.2); parts of plants, grasses, mosses and lichens suitable for ornamental purposes (code 02.30.3); wild growing edible products (code 02.30.4).

There is no accepted and confirmed united list of forest non-wood products and services in Latvia. There is no detailed research of the gain of other national economy branches from the forests in Latvia.

The research aim is to carry out the estimation of FPNWP which are the most essential for Latvia's circumstances determining their gain in Latvia's national economy in 2010.

The following research tasks were put forward to reach the aim:
1. To make a list of FPNWP in Latvia;
2. To determine the significance of FPNWP in Latvia's national economy;
3. To collect information about the amount FPNWP and their monetary expression using the information from the state databases and sociological research;
4. To estimate the contribution of FPNWP in Latvia's national economy in 2010.

Materials and Methods

To determine whether the information of FPNWP and their stocktaking is collected and available the state institutions were interviewed by phone or in writing (Central Statistical Bureau, Nature Conservation Agency, State Revenue Service, State Forest Service), enterprises (JSC 'Latvijas valsts mezi'; Rigas mezi Ltd.; JSC Riga Pharmaceutical Plant, Latvia homeopathy chemists and other enterprises which are connected with the process and purchasing of herbs and food products) and non-governmental organization (Association of Latvia's Florists).

To obtain the information about FPNWP from Latvia (kinds, amounts, own-consumption) the public opinion poll was carried out in cooperation with media, market and public opinion research agency TNS Latvia. Latvia's representative sample population – 1000 residents in the age group 18-74 selected by multistage stratified random sampling method. The method of computerized telephone interview CATI (Computer Assisted Telephone Interviews) was used. Programming of the questionnaire was carried out before the research using BELLVIEW CAPI 5–00–23

which guarantees the range of technical procedures for carrying out the poll as well as successful interview and immediate data input.

The following questions were asked to determine the habits of respondents in using non-wood plant products:

What kind of forest goods did you gather in the forest last year?

How much forest products did you yourself gather this year? (liter or kg)

How much did it contribute in monetary terms to your household this year? (LVL) (please separate own-consumption and value of sold or given to other people/ companies?

The statistic methods were used to calculate the indicators of the general set. The indicators are based on the poll results.

The following connection was used to calculate the standard error of quantitative indications

$$\sigma \bar{x} = \frac{s}{\sqrt{n}} \qquad (1)$$

where
σx – standard error;
s – standard deviation;
n – the number of observations in the sample set.

The following connection was used for calculating the standard error of the proportions

$$\sigma \bar{p} = \sqrt{\frac{p(1-p)}{n}} \qquad (2)$$

where
σp – indicators proportion standard error;
p – proportion between the favourable events and total events within the sample group;
n – the number of observations in the sample set.

The probability interval of the average general set evaluation is determined using the following connection

$$\bar{x} - z_\alpha \times \frac{s}{\sqrt{n}} \leq \mu \leq \bar{x} + z_\alpha \times \frac{s}{\sqrt{n}} \qquad (3)$$

where
$\bar{x}$ – the average value of the sample set;
μ – the average value of the general set;
z_α – the standardized critical value of normal distribution with 95% probability;
s – standard deviation;
n – the number of observations in the sample set.

The probability interval of the proportion of the general set indicators was determined using the following connection

$$\bar{p} - z_\alpha \times \sqrt{\frac{p \times (1-p)}{n}} \leq p \leq \bar{p} + z_\alpha \times \sqrt{\frac{p \times (1-p)}{n}} \qquad (4)$$

To calculate the average error value of the characteristic indicator of the general set which is formed as the correlation of several indicators the following connection was used

$$P_{ij} = \sqrt{P_i^2 + P_j^2}$$
, (5)

where

P_{ij} – the value error of the characteristic indicator of the general set % from the average value;

P_i – i-indicators standard error % from the average value;

P_j – j-indicators standard error % from the average value.

The probability interval of the general set average value is determined with 95% probability considering z=1.96 (Liepa, 1974).

It is supposed in the calculations that the general population in Latvia consists of 1 694 800 residents in the age group 18 - 74 (Iedzīvotāji un sociālie procesi, 2010). The value of FPNWP is calculated multiplying the amount and the average market price of the related product. This value is also referred to FPNWP used for own-consumptions. In calculations one liter of mushrooms weighs 0.4 kg and 1 liter of wild berries weighs about 0.7 kg. According to the opinion of the sociological research people, human habits do not change essentially throughout years.

Results and Discussion

The list of FPNWP for Latvia.

The list of non-wood plant product groups potentially important for Latvia was made using the European classifications and categories of FPNWP (Table 1).

Table 1

The list of FPNWP and the estimation of significance

No.	Plant product group	Plant products	Significance in national economy
1	Christmas/New Year trees	Christmas/ New Year trees	important
2	Mushrooms	*Boletus edulis*, *Cantharellus cibarius*	very important
		Other edible mushrooms	important
3	Fruit, berries, edible nuts	*Ericaceae* family (blueberries, bilberries, bog bilberries, cranberries)	very important
		Rosaceae family (raspberries, blackberries, drupes, strawberries, crab trees)	important
		Empetraceae family (crowberries)	not significant
		Cupressaceae family (junipers)	not significant
		Fagaceae family (oak-tree)	not significant
		Betulaceae family (hazel)	unimportant
4	Resin, medical raw materials, aromatic products, colorants	Pine, spruce tree resin	not significant
		Herbs	important
		Pigment plants	not significant
5	Decorative materials	Birch tree branches (oak, mountain ash, pine etc.)	important
		Moss, lichen, bilberry bush	unimportant
		Cones	unimportant
6	Other plant products	Sap (birch, maple)	important
		Brooms, sauna-brooms	unimportant
		Needles	unimportant

The evaluation of the essence of FPNWP in Latvia's national economy.

The list of criteria and indicators was made to evaluate the significance of FPNWP in Latvia's national economy. The criteria reflect the basic values in the conceptual level, but the indicators are the basic data which give the quantitative and qualitative characteristics of every criterion (position, changes and capacity).

The following indicators and criteria were determined

to evaluate the significance of FPNWP in the national economy:

1st criterion – economical significance:

1st indicator. The amount of supply in the national economy in physical unit;

2nd indicator. The proportion of product supply in the product group;

3rd indicator. The material value (combined and separately for every unit);

4th indicator. Demand for such products;

5th indicator. The influence on other national economy branches;

6th indicator. The legacy of obtaining the product.

2nd criterion – social significance:

1st indicator. The number of inhabitants (proportion) getting personal benefit from the product;

2nd indicator. Employment in obtaining the product;

3rd indicator. Possible threats for society.

Every non-wood plant product has been given the evaluation of its essence according to its significance. There is a 4 point system, where 0 – not significant, 1 – unimportant, 2 – important on average, 3 – very important. The estimation of significance of the FPNWP relating to the worked out criteria and indicators is shown in Table 1. The most significance FPNWP are mushrooms (probably *Boletus edulis, Cantharellus cibarius* as they are commercially most important) and wild berries - *Vaccinium myrtillus* L., *Vaccinium vitis-idaea* L., *Oxycoccus palustris* Pers. of family *Ericaceae*.

The gain amount and monetary value of the FPNWP using the information from the state databases and sociological research.

The information about FPNWP is not available in the state institutions as it turned out during the research. Some information could be found from JSC 'Latvijas valsts mezi' and Rigas mezi Ltd. The members of the Association of

Latvia's Florists acknowledge that they use the decorative materials from forests but they are not purchased, and there is no information about the amount. The enterprises connected with the purchase and processing of berries and mushrooms refused to give official information. Similarly the enterprises connected with purchase of herbs and the production of homeopathic goods refuse to give the official information about the purchased non-wood products (kinds, amount, the country of origin).

In total about 77.1% of respondents gained some forest non-wood products of plant origin. The data acquired at the sociological research show the following significance of the non-wood plant products: 67.6% of respondents gather mushrooms; 35.4% – wild berries, 27.5% cut Christmas and New Year trees, 25.9% gather birch and maple sap, 22.2% gather floristic decorative materials, 16.4% collect herbal plants, 14.4% collect branches for sauna-brooms, but 3.8% other non-wood products (nuts, branches, cones).

The estimation of definite FPNWP (mushrooms, berries, Christmas/New Year trees, birch juice) is done both in physical and monetary units. the calculation of gain amount of the other groups of FPNWP – decorative materials, medical raw materials in physical units (items, kg) is not rational because related products are too different, for example, decorative materials – cones, branches, lichens. The physical amount and monetary values of FPNWP have been summarized in Table 2.

Table 2

The physical amount and monetary value of the FPNWP in Latvia

Products	Totality		Own-consumption		Sold in the market or to other households	
	amount*	value, million LVL	amount*	value, million LVL	amount*	value, million LVL
Mushrooms	21.5±3.0	36.0±9.7	18.9±2.5	31.6±8.3	2. 7±1.1	4.4±2.0
Wild berries	6.1±1.3	11.9±2.9	5.0±0.9	9.7±2.0	1.1 ±0.6	2.2±1.2
Christmas/ NewYear trees	654.7±0.1	3.1±0.5	572.3±84.9	2.7±0.4	82.4±33.4	0.4±0.2
Birch sap	23.6±5.4	15.8±4.5	20.8±4.0	13.9±3.6	2.8±2.3	1.9±1.6
In total		*66.8*		*57.9*		*8.9*

*Measurement units: Mushrooms, Wild berries - million kg; Christmas/ New Year trees - thousand pieces; Birch sap - million liters.

The prices (LVL kg^{-1}) of the gathered mushrooms and wild berries are calculated using the information of those respondents who gather at least 10 kg wild berries a year and the information gained in the internet. 67.6 ± 1.5% of the respondents have gathered mushrooms, on average - 18.84 ± 1.29 kg. The average price of mushrooms is 1.67 ± 0.20 LVL kg^{-1}. Relating to Latvia, it means that 1.15 ± 0.04 million residents have picked mushrooms.

35.4 ± 1.5% of the respondents have gathered wild berries, on average - 10.2 ± 1.1 kg. The average price of

wild berries is 1.96 ± 0.11 LVL kg^{-1}. Relating to Latvia, it means that 0.60 ± 0.05 million residents have picked wild berries.

27.5 ± 1.4% of the respondents have cut Christmas and New Year trees in the forest themselves, on average 1.41 ± 0.1 pieces. The average price of Christmas and New Year trees is calculated using the information of forest attendants, and it is 4.79 LVL. Relating to Latvia it means that 0.47 ± 0.05 million residents have cut Christmas and New Year trees.

25.6 ± 1.4% of the respondents have collected birch or maple sap, on average 53.6 ± 5.5 liters. The average price of sap is 0.67 ± 0.06 LVL l⁻¹. The prices are calculated using the information of forest attendants and the information gained in the internet. Relating to Latvia, it means that 0.47 ± 0.05 million inhabitants have collected birch or maple sap.

The evaluation of FPNWP in Latvia's national economy in 2010.

Non-wood plant product contribution in Latvia's nation economy in 2010 – the amount and value of the own-consumed and sold FPNWP has been summarized in Table 2.

67.6 ± 1.5% of the respondents have gathered mushrooms for self-consumption, on average 16.48 ± 1.04 kg. On the whole 18.9 ± 2.5 thousand tons of mushrooms were in the households. 8.7 ± 0.9% of the respondents have sold mushrooms to others, on average 17.98 ± 3.17 kg. Relating this information to the inhabitants of Latvia - they are 147.3 ± 29.6 thousand people. On the whole, 2.7 ± 1.1 thousand tons of mushrooms were in the market (sold or transferred to other households).

35.2 ± 1.5% of the respondents have picked wild berries for their own-consumption, on average 8.34 ± 0.64 kg. On the whole 5.0 ± 0.9 thousand tons of wild berries were in the households. 4.1 ± 0.6% of the respondents have gathered berries for selling purposes, on average 16.33 ± 3.73kg. Relating this information to the inhabitants of Latvia - they are 69.4 ± 20.8 thousand people. On the whole, 1.1 ± 0.6 thousand tons of wild berries were in the market (sold or transferred to other households).

27.5 ± 1.4% of the respondents have cut Christmas and New Year trees for self-consumption, on average 1.23 ± 0.07 items/ units. On the whole 572.3 ± 84.9 thousand of trees were in the households. 3.0 ± 0.5% of the respondents have sold trees to others, on average 1.62 ± 0.17 trees. Relating this information to the inhabitants of Latvia - they are 50.8 ± 17.9 thousand people. On the whole, 82.4 ± 33.4 thousand of trees were in the market (sold or transferred to other households).

25.6 ± 1.4% of the respondents have collected birch or maple sap for their own-consumption, on average 48.0 ± 4.0 liters. We assume that majority of sap collected is birch sap as maples are rarer and are not so popular in Latvia. On the whole 20.8 ± 4.0 million liters of birch sap were in the households. 3.7 ± 0.6% of the respondents have sold birch sap to others, on average 44.9 ± 17.4 liters. Relating this information to the inhabitants of Latvia - they are 62.7 ± 19.8 thousand people. On the whole, 2.8 ± 2.3 million liters of birch sap were in the market (sold or transferred to other households).

On the whole, the contribution of non-wood products in Latvia's national economy was 66.8 million LVL, from it 8.9 mill. LVL – the value of the products for sale in the market or exchange with other households.

Systematic bias is possible in the evaluation because considering the labour market opportunities in foreign countries, there are less inhabitants in Latvia than shown in the database of statistics. In an ideal case it would be necessary to calculate the product price at the forest. But in this case the market prices found in the internet as well as given by the respondents were included in the evaluation. The market prices also include the product gathering and transportation costs.

Unfortunately, it was not possible to obtain information about the amount of the purchased nature products grown in Latvia for the comparison and checking. To get more credible information about the gain of FPNWP in Latvia's national economy, it is necessary to estimate the inclusion of such information in the state statistic programme.

Conclusions

1. 77% of the residents of Latvia aged 18 - 74 have gained the forest plant non-wood products (FNNWP) in Latvia in 2010.
2. The most significant FPNWP are mushrooms, wild berries and birch sap.
3. The contribution of FPNWP in the Latvia's national economy in 2010 was 66.8 million. LVL, including 8.9 million. LVL for the products sold in the market or transferred to other households.

Acknowledgements

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