CHARACTERISTICS OF LAND RESOURCES IN LATVIA

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In Latvia, 98% of land is situated in the countryside. From the total area of Latvia, 46% of it comprises woodland and 38% is agricultural land. In 2006, 73% of agricultural land was arable land. Having investigated information from different state institutions’ databases, such as State Land Service, State Forest Service, Rural Support Service and scientists’ database, the essential quantitative differences were found. In Latvia, different institutions measure and record land areas differently. In this research paper, the author performs a comparative analysis of agricultural land and woodland in the four above-mentioned institutions’ data bases. Various quantitative and qualitative measurements were applied in the analysis of land. For example, the measurements for agricultural land were cadastral value and the estimate in points of land quality, for woodland – cadastral value and the price of land and their changes in the years 2000 – 2006. The price of land has substantially increased in Latvia – it increased twice for woodland and 3.4 times for agricultural land and it still continues to grow.

The method of net income (revenues minus possible expenses in managing cycle) was used to evaluate the efficiency of forest growth, while gross discharge was used for crops. The author states that forest growth can successfully compete with agricultural crop cultivation on the circumstances of extensive management.

Key words: agricultural land, woodland, efficiency, information.

JEL Classification: Q23, Q24.

Introduction

In economics, a term land is used to describe natural resources which are only one part of production factors. Together with labor and production resources they form joint economic resources (Steinleiks, 1997). Land is the most valuable resource in most countries. Accesses to land, security of tenure and land management have significant implications for development (FAO, 2007).

The broadest meaning of land can be found in agriculture. In agriculture, the term land can be used as:

- Territory, where the agricultural production is produced;
- Work object, on which human efforts and capital are directed in order to prepare land for producing agricultural products;
- Work tool, with which has an impact on other objects and raw materials – microfauna and microflora of green plants, regulates humidity, warmth and is a source of plant nutrition (Dobele, 2005).

This feature is also similarly present in other EU countries. For example, in Poland, agricultural land has different functions. The most important ones are industrial, ecological and natural landscapes. Together with social and economic development of the society, the last two functions become more and more important, while the first function loses its value (Zaremba, Kowalczyk-Kassyk, 2007). The effectiveness of land and its usage is important in Latvia, since 98% of land is situated in the countryside where 31% of state inhabitants live (Gaugere, 2003).

It is important to note that when land resources used in agricultural production decrease and land exploitation for non-agricultural purposes increases it is necessary to use the land presumably effectively. If land cannot be used efficiently in agriculture, it is necessary to vacate it for the needs of other uses – forestry, civil engineering, etc., where it is possible to get higher economic benefits.

In April 28, 1998, the Minister Cabinet of the Republic of Latvia approved Forestry Policy, one of the main goals of which is to promote marginal utilization of agriculture land for planting trees in order to increase woodland, using current state support measures (Zemkopības ministrijas informācijā, 2007). Stock Corporation “Latvian State Forests” ordered a group of scientists to do a research “The Evaluation of Agricultural Land Use Efficiency and Opportunity”, which was not published yet. The research is used in this research paper.

The aim of the work is to display the results of the research and to analyze different information sources about agricultural land and woodland of Latvia from quantitative, qualitative and economic aspects.

The main tasks of the work are:
1. To evaluate quantitatively land resources and their structure in Latvia.
2. To analyze the main quantitative and qualitative indicators of agricultural land and woodland.
3. To determine the efficiency of forest growth and the main crop cultivation in agriculture.
Materials and Methods

The methods of analysis and synthesis are used to accomplish the tasks of the work, to investigate the elements of the problem and to analyze interconnections, and to make general conclusions using separate facts and different information sources, as well as the method of logical construction.


2. State Forest Service (SFS) data (Valsts meža dienesta informācija, 2006).
3. Rural Support Service (RSS) – Field Register information (Lauku atbalsta dienesta informācija, 2006).

It should be noted that this kind of research is relatively new and there is a limited number of previous research papers written in Latvia. One of the main previous research articles which is used by the author is J.Jansons research “Woodland Resource Situation in the Republic of Latvia as of 2005” In addition, A.Dobele has also researched it in her doctoral theses “Land Resource Utilisation in Latvia” performed as of 2005.

Information about agricultural land and woodland and their quantitative and qualitative indicators in Latvia are used for investigation. In addition, the questionnaire was carried out to identify efficiency of forest growth. Overall, questionnaires were sent to 25 associations of forest owners, LSFSI Silava and Stock Corporation Latvia State Forests.

The majority of the terminology used in the research paper is widely known. However, one term requires an explanation – gross discharge\(^1\), which is used to evaluate economic benefits of certain agricultural crop cultivation.

\(^1\) Gross discharge – is difference obtained from gross production value including state and EU support payments subtracting variable costs

Result Evaluation and Discussion

1. Land Resources in Latvia

It is essential to analyze land resources and its utilization in Latvia. The importance of such investigation was also discussed in the organization of Food and Agriculture of the United Nations (FAO). It claimed that current use of land is a criteria for better targeting areas for implementing projects by local or international entities (George, Nachtergaele, 2002). In order to determine efficient use of land, it is important to evaluate why different state registers have different land area data and note these differences. Aforementioned is a basis for the need of having a unified classification and registration system in Latvia. The effective land use classification is widely recognized as the comparison of land use across time and space, which can be used for a broad range of policy, land use planning and statistics (...). The main users of land use classification are policy makers of international organizations, policy maker’s international organizations, land use planners, and scientists (Mucher et al, 1993).

Moreover, this research paper indicates how large the discrepancies are and where they exist in Latvian system of registering land.

According to SLS data, as of the beginning of 2006 the territory of Latvian rural area (without republican significant cities) was 6391.4 thousand ha. Chart 1 shows the structure of total land use forms. As it can be observed from the chart, 46% or 2909.6 thousand ha of total area are forests, and 38% or 2458.3 thousand ha are agricultural land. The other land use forms comprise 16% of total area. It includes 1% of land used for courtyards and up to 4% is occupied by swamps and areas under the water. Bushes occupy 115 thousand ha or 2% of the whole territory.

Analyzing agricultural land, it is observed that 73% or 1793.3 thousand ha are arable area, 17% or 409.6 thousand ha are grasslands, 9% or 226.5 thousand ha are meadows, and 1% are orchards. Total area that is not served from the chart, 46% or 2909.6 thousand ha of total area are forests, and 38% or 2458.3 thousand ha are agricultural land. The other land use forms comprise 16% of total area. It includes 1% of land used for courtyards and up to 4% is occupied by swamps and areas under the water. Bushes occupy 115 thousand ha or 2% of the whole territory.

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\(\text{Gross discharge} = \text{Gross discharge} - \text{Gross discharge cost of technical services} \)
2. The Quantitative Characteristic of Agricultural Land

In order to characterize available land in agriculture, the data and information from the following three institutional databases are compared:

1. SLS, where 2458.3 thousand ha agricultural land are registered (Valsts zemes dienesta informācija, 2006).

2. RSS the Field Register, where 2337.0 thousand ha agricultural land are registered (Lauku atbalsta dienesta informācija, 2006) and this data is used as a basis of the EU direct payments calculations.

3. LSFSI Silava, where 3067.4 thousand ha agricultural land are registered (Jansons, Zariņš, 2007).

The difference between SLS and RSS registered agricultural land is 121.3 thousand ha or on average 5%. While comparing these data on regional level, only in Daugavpils region RSS Field Register has registered larger agricultural land area than it is registered in SLS for approximately 1092 ha. In other 25 regions of Latvia, data of agricultural land in the databases of SLS and RSS differ insignificantly in the regions of Jelgava and Dobele – 2% or 1480 ha and 1771 ha respectively.

A completely different situation is when comparing agricultural land in the SLS and LSFSI Silava data bases, only in two regions: Dobele and Gulbene. These areas are registered to be larger in SLS database than in LSFSI Silava. In general LSFSI Silava agricultural land surpassed SLS data of 609.1 thousand ha or 25% and RSS the Field Register existent area of 730.4 thousand ha or 31%.

The differences in various regions fluctuate from 5598 ha in Bauska region up to 52 616 ha in Liepaja region, that if compiled, derives the aberration from 5% up to 36% when comparing the data of LSFSI Silava with that of SLS. Thereby, obviously, it is necessary to evaluate carefully LSFSI Silava data about agriculture land in Latvia.

3. The Quantitative Characteristic of Woodland

As a large fraction of land in Latvia comprises of woodland it is important to analyze the areas of woodland recorded in various databases. According to Wikipedia: Woodland is an area covered by trees, differentiated from a forest. A forest has largely a closed canopy – the branches and foliage of trees interlock the overhead to provide extensive and nearly continuous shade. Woodland, on the other hand, allows sunlight to penetrate between the trees, limiting shade (Wikipedia, 2007). A similar comparison on woodland has been comparing the data in following databases:

1. SFS, where 2950.3 thousand ha woodland are registered (Valsts meža dienests, 2006).

2. SLS, where 2909.6 thousand ha woodland are registered (Valsts zemes dienesta informācija, 2006).

3. LSFSI Silava, where 3391.5 thousand ha woodland are registered (Latvijas Valsts mežzinātņu institūta Silava informācija, 2006).

Having analyzed the data of Latvia's regions, it can be concluded that generally in SFS there are about 40.7 thousand ha more woodland registered than in SLS. In 10 regions these differences can be considered as inessential and allowable for errors within reasonable limits (if the difference is under or slightly above 300 ha). In the regions of Ventspils, Riga, Liepaja and Cesis the differences are significant and comprise 78% of the total common woodland area, i.e. 31608 ha.

The hypothesis established and propounded is that if SFS database includes existent areas of woodland larger than the ones in SLS due to swamps, the total swamp areas in SLS are about 68324 ha larger, and together form 37% more than in SFS. Having investigated the information, it is discovered that in all regions, except Talsi, swamp areas are bigger in SLS database, while in four regions – Rezekne, Kraslava, Valmiera, Ludza - these differences are notable and surpass 5000 ha. It is possible to conclude that woodland and swamp areas overlap. How-
ever, this is not true since only in Jelgava region these areas mutually smooth out.

According to the data of LSFSI Silava about woodland areas in Latvia’s regions, the total area of woodland is 15% or 441.2 thousand ha more than in SFS and 16.6% or 481.9 thousand ha more than in SLS data base. The differences are fundamental in the majority of Latvia’s regions, for example, in Madona region 35 292 ha, in Riga region 32 973 ha and in Kuldiga region 31087 ha.

4. The Qualitative Characteristic of Land

As the theory is developed that less fertile soil should be used for non-agricultural purposes, thus it is necessary to determine what their locations in the regions of Latvia are. Two indicators are used for the qualitative characteristic of agricultural land:

- The average weighted agricultural land qualitative estimate (in points per ha, which is a measurement of how fertile is the soil - the higher number of points the more fertile soil).
- The agricultural land cadastral value (LVL\(^1\) per ha).

Data about the quality of agricultural land are summarized in the chart 2.

In Latvia, the average of weighted agricultural land qualitative estimate in points is the lowest in the regions of Ludza and Balvi – 31 and 32 points, while the highest is in the region of Bauska – 52 points, in the regions of Jelgava and Dobele – 49 points.

The average weighted agricultural land qualitative estimate in Latvia is 36 points. Such a land estimate is also in three regions: Preili, Riga, Talsi, which together form 10.6% of total agricultural land or 260.5 thousand ha. The qualitative agricultural land estimate which is more above the average is in 13 regions or totally 47% of areas. In total, this area forms 1155.5 thousand ha. However, there are 10 regions where this land estimate in points is below the average in Latvia and form 42.4% or 1042.3 thousand ha of total area. Slightly different tendencies are observed when comparing agricultural land cadastral value estimates (which are calculated using government methodology and is applied by State Land Service), because not only soil fertility is appreciated, but also other economic indicators play a role and partially testifies possible economic profitablness. The highest cadastral estimated agricultural land are in Jelgava, Dobele, Riga regions – respectively 248.16 LVL per ha, 208.67 LVL per ha, 206.33 LLV per ha; the lowest – Balvi, Aluksne, Kraslava and Ludza regions – below 100 LVL for each hectare and that conforms to the lowest average weighted agricultural land qualitative estimate in points.

Agricultural land quality can be evaluated by analyzing its price. Totally, in Latvia from 2000 until 2005, agricultural land price increased 3.4 times from 140 LVL per ha in 2000 up to 478 LVL per ha in 2005 and it is still increasing. Analyzing the data on the price of agricultural land, three significant groups of agricultural land price are formed:

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\(^1\) Latvian lats
• the highest prices ~ 800LVL per ha and above were in 2005 in Bauska, Riga, Jelgava, Ogre and Dobele regions, where they were increasing fastest of all in comparison to 2000 and 2003;
• the average price level – 400 - 600 LVL per ha were in 10 regions in Latvia;
• the lowest prices – below 400 LVL per ha – were observed in 11 regions. Although, the difference in agricultural land price in this group is more than twice.

Seven of these regions – Balvi, Aluksne, Madona, Ludza, Rezekne, Kraslava and Jekabpils were also among the lowest average weighted agricultural land qualitative estimate in points and cadastral value.

SLS data on woodland cadastral value LVL per ha is used for the qualitative characteristics of woodland. The woodland cadastral value is compared with agricultural land cadastral value of appropriate regions (Chart 3).

![Chart 3](image)

Chart 3 reveals that cadastral value of woodland presents the same trend as agricultural land. In Jelgava, Bauska, Dobele regions is high not only cadastral value for agricultural land, but also it is high for woodland. However, the highest cadastral value for woodland is in Tukums and Saldus regions. Kraslava and Ludza regions have lower estimate for agricultural land than for woodland. In the regions of Kuldiga and Cesis, the cadastral value of woodland surpasses agricultural land cadastral value for 8% and 2% respectively. In other regions, the value of woodland is lower than that of agricultural land. The cadastral value of woodland varies from 60% in Jelgava, 62% in Rezekne, 64% in Ventspils, 66% in Riga regions till 98% in Madona, 97% in Liepaja regions comparing to agricultural land value. In Ludza, Kraslava, Rezekne, Balvi, Preili and Aluksne regions, there is not only the lowest cadastral value of woodland, but also the lowest average weighted agricultural land qualitative estimate in points. Thus, it can be stated exactly that these regions will possibly be appropriate for further agricultural land afforestation.

The prices presented by SLS are used for the evaluation of woodland. If in 2000 forestland price for a hectare was on average 350 LVL, then in 2005 – 694 LVL which presents growth approximately twice. In comparison to agricultural land value, the difference in prices between agricultural land and woodland decreased. In 2000, the value of woodland was 2.5 times higher than agricultural land value, but in 2005 only 1.45 times higher. The lowest prices of woodland in 2005 were observed in those regions of Latvia where the cadastral value of agricultural land was also the lowest. In separate regions – Gulbene, Balvi, Aluksne and Kraslava, the price of woodland has changed insignificantly in recent years.

Since there are various possible land prices (cadastral, market etc) due to different calculation and measurement methods it is important to have sufficient, qualified and experienced specialists of evaluation. Market prices should be recorded and publicised. The valuations supplied by private assessors should be crossexamined to ensure that they represent the full market price (FAO, 2007).
5. The Evaluation of Land Use Efficiency

The results of the questionnaire about the efficiency of forest growth are accurately evaluated to determine which data is necessary for calculations. The information acquired as the result of experts’ evaluation is summarized in table 1.

Thus growing efficiency of three main species of compared trees depends on:
- Forest regeneration expenses, which are the highest for pine and they surpass birch plantation arrangement by 8% and spruce - by 9%.
- Forest care expenses, which are approximately the same for pine and birch plantations, however they are slightly less for spruce.
- Forest maintenance expenses a year which vary from 3.56 LVL per ha for pine up to 3.65 LVL per ha for spruce.
- Forest exploitation expenses, which differs based on their composition, while together they comprise 22.96 LVL per m$^3$ for all analyzed species of trees.
- Length of cultivation – the quickest growing tree is birch – on the contrary pine trees growing cycle is comparatively very long.
- Wood outcome for one production cycle varies from 291.24 m$^3$ per ha for birch up to 311.88 m$^3$ per ha for spruce.
- Current prices of birch are 43.43LVL per m$^3$ and they are very close to pine and spruce prices – slightly above 49 LVL per m$^3$.

Table 1. Calculations of Growth Efficiency for Different Species of Trees

<table>
<thead>
<tr>
<th>No</th>
<th>Revenues / Expenses</th>
<th>Pine</th>
<th>Spruce</th>
<th>Birch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total expenses of forestry, LVL per ha</td>
<td>876.19</td>
<td>771.65</td>
<td>743.05</td>
</tr>
<tr>
<td>2.</td>
<td>Regeneration of forest (Soil preparation, seedling and planting expenses), LVL per ha</td>
<td>385.90</td>
<td>352.72</td>
<td>358.29</td>
</tr>
<tr>
<td>3.</td>
<td>Forest care expenses (Agrotechnical control and structural care), LVL per ha</td>
<td>130.73</td>
<td>123.28</td>
<td>129.16</td>
</tr>
<tr>
<td>4.</td>
<td>Forest maintenance expenses per year (Forest infrastructure maintenance costs, administrative and other forest related expenses), LVL per ha</td>
<td>3.56</td>
<td>3.65</td>
<td>3.60</td>
</tr>
<tr>
<td>5.</td>
<td>Forest exploitation expenses, LVL per m$^3$ (5=5.1+5.2)</td>
<td>22.96</td>
<td>22.96</td>
<td>22.96</td>
</tr>
<tr>
<td>5.1.</td>
<td>Main felling output (sanitary clearing – preparation, wood hauling, wood transportation)</td>
<td>11.02</td>
<td>11.00</td>
<td>11.04</td>
</tr>
<tr>
<td>5.2.</td>
<td>Thinning output (sanitary clearing – preparation, wood hauling, wood transportation)</td>
<td>11.94</td>
<td>11.96</td>
<td>11.92</td>
</tr>
<tr>
<td>6.</td>
<td>Cultivation years</td>
<td>101</td>
<td>81</td>
<td>71</td>
</tr>
<tr>
<td>7.</td>
<td>Wood outcome in main felling, m$^3$ per ha</td>
<td>256.00</td>
<td>255.13</td>
<td>248.14</td>
</tr>
<tr>
<td>8.</td>
<td>Wood outcome in thinning, m$^3$ per ha</td>
<td>54.50</td>
<td>56.75</td>
<td>43.10</td>
</tr>
<tr>
<td>9.</td>
<td>Wood outcome in managing cycle (the main felling+ thinning (included sanitary clearing etc.), m$^3$ per ha</td>
<td>310.50</td>
<td>311.88</td>
<td>291.24</td>
</tr>
<tr>
<td>10.</td>
<td>Total expenses in main felling, LVL per ha (10=7*5+1)</td>
<td>6753.95</td>
<td>6629.43</td>
<td>6440.34</td>
</tr>
<tr>
<td>11.</td>
<td>Total expenses in managing cycle, LVL per ha (11=9*5+1)</td>
<td>8005.27</td>
<td>7932.41</td>
<td>7429.92</td>
</tr>
<tr>
<td>12.</td>
<td>Current prices, LVL per m$^3$</td>
<td>49.08</td>
<td>49.27</td>
<td>43.43</td>
</tr>
<tr>
<td>13.</td>
<td>Revenues, LVL (13=9*12)</td>
<td>15239.34</td>
<td>15366.33</td>
<td>12648.55</td>
</tr>
<tr>
<td>14.</td>
<td>Net income, LVL per m$^3$ (calculated in current prices)</td>
<td>23.30</td>
<td>23.84</td>
<td>17.92</td>
</tr>
<tr>
<td>15.</td>
<td>Net income, LVL per ha (calculated in current prices)</td>
<td>7234.07</td>
<td>7433.92</td>
<td>5218.63</td>
</tr>
<tr>
<td>16.</td>
<td>Average annual net income for production cycle, LVL per ha</td>
<td>71.62</td>
<td>91.78</td>
<td>73.50</td>
</tr>
<tr>
<td>17.</td>
<td>Average annual net income for production cycle, LVL per m$^3$</td>
<td>0.23</td>
<td>0.29</td>
<td>0.25</td>
</tr>
</tbody>
</table>

The average annual net income can be calculated together with the forest growth revenues. The highest result is obtained for spruce – 91.78 LVL per ha; for birch – 73.50 LVL per ha; and for pine – 71.62 LVL per ha.

The efficiency of land use in agriculture is characterized by the amount of acquired products from each hectare and associated net income, as well as expenses related to the creation of the volume of production output. These are the main indicators which cause the gross discharge, which is one of the most important components in the analysis and forecasting of management approach in agriculture.
As it can be observed in chart 4, there is a proof that forest growth can compete successfully with crops in the sense of growing efficiency, calculating on 1 ha acquired net income/ gross discharge, if the crops are not grown intensively and land is not used for the highest harvest production. Of course, net income from forest growth is available for a long time, which sometimes surpasses the length of human life. Nevertheless, if taking into account the possibility to grow forest in poor agricultural soil and further out of product sale in markets, there are some advantages for forest planting in comparison to agricultural crop cultivation. In addition, there is a concern that a landscape will fail to sustain jobs, rural community vitality, and the nation’s wood supply, and that the ecological functions of forest will be compromised (Wolf S.A. and Hufnagl-Eichener S., 2007). Therefore, it is essential to focus on forest growth. The only impediment could be the lack of financing as the movement of financial capital from 71 up to 101 years (trees growing period), practically the investment in the resources would contribute to the welfare of our children and grandchildren.

Conclusions

1. The term Land as a factor of agricultural production has a wide meaning. It is a territory where the agricultural production, work object and work tools are located. In forestry, land has 3 main functions – a territory, what the forests occupies and participates as a producing factor; a soil on which trees are growing; and a resource of wood production and elements of forest infrastructure. In the future, land functions can be expanded due to increasing energy power production from wood.

2. Comparing available data from the databases of four different institutions (SLS, RSS, SFS and LSFSI Silava) for agricultural land and woodland, the author has found significant recording differences of these lands in Latvia. Thus, it is necessary to define information in various databases for all institutions (especially RSS and SFS and also SLS), because some differences stated in this research are essential for political and strategic decision making, as well.

3. Having evaluated the data of different institutions on available land in agriculture and woodland, it can be stated that nowadays there is a lot of unused agricultural land, where agriculture will never get in and where there is no economic motivation to use it for agriculture. Thereby, it is necessary to work out a strategy how to encourage forest planting and growing. This has also been proved by qualitative analysis of agricultural land and woodland. It is functional to use not only less qualitative land for forest growth in distant regions of Latvia, but it is necessary to re-evaluate separate fields in the regions of highly intensive agricultural production, where it is hard to access these plots due to lack of access roads or their location, as for instance in the middle of forests, for utilization as a woodland.

4. It is substantial to ensure efficient land use as during the last years in Latvia, the price for agricultural land and woodland has been increasing.

5. Growing efficiency of pines, spruces and birch planting has been calculated in the whole cycle of growth. The results show that average annual net income for 1 ha are the highest for spruce – 91.78 LVL; for birch – 77.50 LVL; and for pine – 71.62 LVL. These indicators indicate that forest growth can efficiently compete with the agricultural crops cultivation.

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