

Empirically Based Grouping of Private Forest Owners in Lithuania

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Abstract

In Lithuania there are 231,878 private forest owners (2005-01-01). They differ according to age, sex, education, social status, area of private property and other characteristics. All these characteristics determine the goals and problems of private forest owners. Even though there is a great variety, it is possible to group forest owner according to their attitudes towards the management of their forest property. Based on a survey among Lithuanian private forest owners four types of owners were identified: (1) *businessmen*, (2) *multi-objective owners*, (3) *consumers*, (4) *ecologists*. The article presents a description of these typological groups.

Key words: forest owner, survey, cluster analysis, groups of forest owners.

Introduction

In Lithuania during the 20th century the share of private forests continually changed. Private forest ownership dominated till 1920. Private forest owners owned about 65% of the total forests area. 600,200 hectares of private forests were transferred into State Forest during 1919-1937. In 1938 private forests constituted only 173,000 hectares (about 16% of the total forest land area). During 1940 a share of the private forests was nationalized by the Soviet Government. From 1950 to 1990 private forest ownership was avoided in Lithuania. After the declaration of independence, forest property rights were restored. According to the Forest Act of the Republic of Lithuania, forests are divided into state and private. The structure of forest ownership has changed due to an ongoing Land Reform process. The reform of forestland was implemented more than 10 years ago and still remains an ongoing process. The private forest sector constitutes 684,451 hectares of private forest (01-01-2005) (Figure 1). This is 33% of the total forest area a figure that is projected to increase to 40-45% in the future.

The average size of private forest properties is 4.6 hectares. Private forest owners differ according to age, sex, education, social status, area of private property and other characteristics. All these characteristics determine the goals and problems of private forest owners. The great variety of forest owners in Lithua-

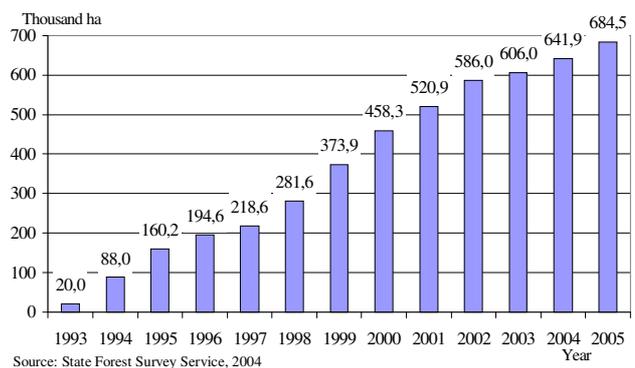


Figure 1. Forest restitution in Lithuania (1993-2005)

nia makes it interesting to group them according to their attitudes towards the management of their private property. Such grouping is necessary for providing a better understanding of what rationales motive various groups of forest owners and discuss how that knowledge may influence forest policy formulation and implementation in Lithuania.

Private property in western European countries has a long tradition. It was formed through long periods of time and was influenced by economic, ecological and social factors. In some western European countries the typology of private forest owners is already created. However, each country has its own unique typology of private forest owners. The grouping of a country's private forest owners depends on

the characteristics of the owners and their properties, on the private forest ownership traditions and on social, economic and ecological factors. In general, the main criteria used for grouping private forest owners are defined. The most commonly used criterion is ownership objectives.

In Finland (Karppinen 1998) private forest owners are divided into four groups according to ownership objectives: recreationists, self-employed owners, investors and multi-objective owners. *Recreationists* emphasize non-timber and amenity aspects of their forest ownership, such as outdoor recreation, aesthetic considerations and berry-picking. *Self-employed* owners value regular sales, labour income from delivery sales (the seller does the logging and hauling) and employment provided by their forests. The importance of household timber is also emphasized. *Investors* regard their forest property as an asset and a source of economic security, such as security against inflation and for old age. Bequest motives are also emphasized. *Multi-objective owners* value equally both the short-term and long-term monetary benefits as well as amenity benefits of their forests. Whereas in Denmark there are three private forest owner groups: classic owners, hobby owners and indifferent farmers (Boon, Meilby and Thorse 2004).

Lönnstedt (1997) compiled a qualitative study presenting the goals emerging from forest owners in Sweden. These are divided into five classes: formal economic goals; informal economic goals; production; environmental goals; and intangible goals. *Formal economic* goals include the categories of cash flow, liquidity reserve and capital growth; hunting, firewood and wood for household purposes are included among the *informal economic goals*. *Production goals* contain different silvicultural methods and aesthetics. *Intangible goals* include a certain life style, whilst the *environmental goals* are not discussed. According to Hugosson and Ingemarson (2004) the motivations and objectives were described and structured according to the information given during the interviews. Four motivations emerged containing 15 abstracted objectives of small-scale forest owners in Sweden: production, amenities, conservation, and economical efficiency. In foreign countries the conducted investigations on the private forest owners' typology cannot be adopted directly to the specific Lithuanian conditions. However, they are critical for the methodological aspect.

In the literature by researchers of different countries (Härdter 2002, Hugosson and Ingemarson 2004, Karppinen 2000, Kline, Alig and Johnson 2000, Kuu-luvainen and Karppinen, 1996, Lidestav and Ekstrom 2000, Lönnstedt 1989, Ripatti and Järveläinen 1997) are presented articles about forest ownership objec-

tives, private forest owner's motivations, values, attitudes, private forest owners and their forest properties characteristics, private forest owner's grouping. The methods and results presented in the articles are valuable and have been used as a source of information and experiences for the designing and implementation of the survey in Lithuania. Private forest owners' surveys in Lithuania were conducted by other authors as well (Pivoriūnas and Lazdinis 2004, Dudutis and Kupstaitis 2004). The surveys results on the objectives and problems of private forest owners are similar and support our conclusions. However the statistical data analysis of the mentioned works was not carried out.

The purpose of this work was to group the Lithuanian forest owners according to their objectives by using the data obtained from survey interviews and applying a cluster analysis.

Material and methods

This article is written by using research data of private forest owners carried out in 2004. Investigations were conducted in all ten Lithuanian counties using the method of interviewing (personal visiting) by prepared questionnaires. The unit of research is private forest owner. For the selection of respondents the database from the public company "Registru Centras" containing data on all forest owners was used.

The selection of people interviewed was defined by using the formula (Kardelis 1997):

$$n = (z^2 * s^2) / \check{\Delta}^2 = (1,96^2 * 50^2) / 4^2 = 600,25$$

where: n – number of cases in the cross-section group; z – coefficient from the Student distribution tables, chosen according to the reliability required. In this case reliability is 95% (p = 0,05), t = 2; s – medium square deviation of the selection of people interviewed, where percent on the pilot study is defined qualitative index; $\check{\Delta}$ – permitted inaccuracy, which is chosen depending on the required accuracy.

The sample consists of 601 respondents. Referring to the results of earlier interviews (Mizaraitė 2001) and gained experience, 11% more respondents were selected than defined in the original selection group for the survey. In total 670 respondents were selected for the survey. Distribution of private forest owners and the number of respondents according to counties is presented in Table 1.

Twelve selected respondents refused to take part in the survey due to personal reasons and ten questionnaires were rejected due to inadequate filling in.

Table 1. Distribution of private forest owners and respondents according to the counties

County	Private forest owners		Sample
	N	%	n (+11%)
Alytus	30 655	14,30	86 (+10)
Kaunas	23 469	10,95	66 (+8)
Klaipėda	13 902	6,48	39 (+4)
Marijampolė	6 207	2,89	17 (+2)
Panevėžys	26 252	12,25	74 (+8)
Šiauliai	17 879	8,34	50 (+6)
Tauragė	11 931	5,57	33 (+4)
Telšiai	15 762	7,35	44 (+5)
Utena	33 452	15,60	94 (+11)
Vilnius	348 75	16,27	98 (+11)
In total:	214 384	100.00	601 (+69)

The questionnaire prepared for interviewing respondents contained 26 questions. Questions presented in the questionnaire were about:

- Characteristics of forest owner (age, sex, residence, occupation, education, duration of ownership, decision making etc.);
- Characteristics of forest holding (holding size, acquisition of holding, etc.);
- Management activities in the forest holding (forestry-related activities, organizing methods and forestry-related problems);
- Management objectives (timber for selling, timber for fuel, non wood products, hunting, etc.);
- Forest ownership problems (lack of funds and experience, non qualified consultants, etc.).

Information obtained by questionnaires was analysed and grouped using statistical methods and a cluster analysis performed. The main feature for grouping was the purpose of management. Respondents ranked their management goals by importance. All ownership objectives were marked using the same five-level ordinal scale, where 1 corresponds to “absolutely not important”, 2 to “not important”, 3 to “neither/nor” 4 to “important” and 5 to “very important”. The distribution of answers is shown in Table 2. In this table there are presented the data from 648 questionnaires.

Table 2. Survey question used for cluster analysis

Question	Percentage of answers					
	1	2	3	4	5	
How important are each of the following forest ownership objectives for you?	Absolutely not important	Not important	Neither/nor	Important	Very important	Not marked
Income generation from wood and non-wood products sales	17.3	5.9	10.2	6.9	38.1	21.6
Round wood production for home consumption	17.8	5.6	10.0	8.9	35.0	22.7
Firewood production for home consumption	15.7	4.8	9.0	8.3	45.5	16.7
Recreational use	44.0	6.0	6.3	2.6	8.3	32.7
Forest holding use for hunting purposes	50.0	3.6	5.2	2.5	5.7	33.0
Non-wood products use for home consumption	25.0	7.1	10.7	8.9	23.6	24.7
Protection of wild life habitat	19.5	7.1	9.9	8.3	27.6	27.6

For the cluster analysis data from 415 questionnaires were used because some of respondents did not indicate the importance of some management goals. K-means clustering analysis of the STATISTICA software package was used. The clustering procedure is conducted in several stages:

- Objects are divided into k primary clusters;
- In sequence the distance of every object to the centre of clusters is counted. The distance is calculated by using a Euclid metric square. An object is allocated to the closest cluster and the centres of the clusters are recalculated.
- Step two is repeated until there is no more re-distribution.

Variables are standardised. With the help of the cluster analysis the typology of private forest owners is formed according to their management objectives. According to certain socio-demographic characteristics each forest owner is placed into one of the clusters.

Results

With the help of the cluster analysis four clusters are formed. The first cluster is termed “businessmen” (119 observations); the second group - “multi-objective owners” (127 observations); the third group - “consumers” (94 observations); and the fourth group - “ecologists” (75 observations). Table 3 presents forest owners’ management objectives for each cluster and their evaluation according to the importance mean values. Figure 2 presents the same result just with the standardised variables.

The main characteristics of clusters are presented in Table 4. The cluster “*businessmen*” is represented by forest owners to whom income for sold wood and non-wood products is the main objective of forest management. This is the second biggest cluster with 119 members. Forest owners of this cluster and cluster “*multi-objective owners*” possess the biggest forest properties. Forest owners of this cluster on av-

Table 3. Mean values of responses in questions for the four clusters

Variables	Ownership objective	Owners businessmen	Multi-objective owners	Owners consumers	Owners ecologists	Average
AV1	Income generation from wood and non-wood products sales	4.01	4.61	1.59	2.74	3.42
AV2	Round wood production for home consumption	2.76	4.76	3.42	1.85	3.36
AV3	Firewood production for home consumption	2.76	4.77	4.60	1.45	3.56
AV4	Recreational use	1.12	2.87	1.21	1.99	1.83
AV5	Forest holding use for hunting purposes	1.12	2.38	1.29	1.60	1.63
AV6	Non-wood products use for home consumption	1.37	4.44	2.83	2.85	2.91
AV7	Protection of wild life habitat	1.40	4.63	3.04	3.81	3.20

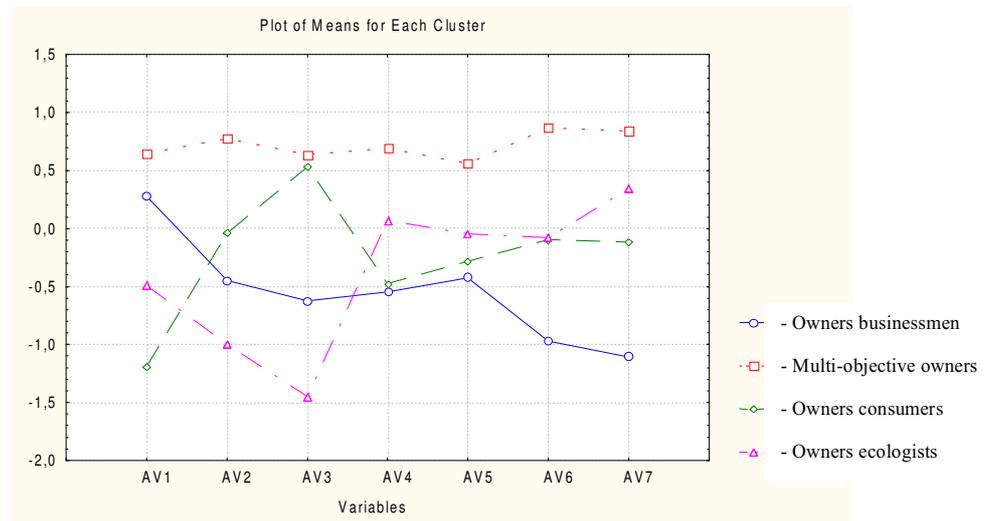


Figure 2. Mean response values for four clusters

erage possess forest properties of 13.37 ha. About 65% of owners reside in cities and the average distance from the forest holding to their residence is 44.7 km. The average age of the owners in this group is 50.9 years. The “businessmen” group has the shortest forest ownership time with an average time of 4.98 years. However, the silvicultural activity index is highest equalling 2.5. Comparing with other clusters owners representing this cluster are most active. Even though the knowledge in the field of forestry is not the highest, the forest owners’ forestry-related knowledge index reaches 0.93.

Cluster of “multi-objective owners” is represented by the owners to whom many forest management objectives are important. This is the biggest cluster with 127 member compared with a total sample. Forest owners of this cluster possess the largest forest properties, on average 14.97 ha. 46.03% of the owners reside in the most forested counties

(Alytus, Utena and Vilnius). 55.56% of forest owners live in the countryside and the average distance from the forest estate to their residence is 35.4km. Average age of owners in this group is 53.7 years. The average period of possessing a forest property is 5.62 years. The silvicultural activity index is 2.2. Owners representing this cluster are moderately conducting silvicultural measures. Forestry knowledge of this owner cluster and the cluster of “consumers” is the highest with an index of 1.2. The number of owners who possess forest holdings with co-owners is not big, as in other clusters making up 23.81%.

The owners to whom the main objective of ownership is extraction of wood and non-wood products for personal use represent the cluster “consumers”. Wood for fuel is a very important objective for forest owners. This is the third biggest cluster with 94 owners. 57.4% of owners are women. Owners of this cluster on average possess properties of only 6.92

Table 4. Owner and forest characteristics by owner cluster

Characteristic	Owners businessmen	Multi-objective owners	Owners consumers	Owners ecologists	p-level
Women (%)	40.3	42.5	57.4	52.0	0.04
Men (%)	59.7	57.5	42.6	48.0	
Mean age (yrs)	50.9	53.7	55.4	50.3	
Professional education:					
University degree (%)	41.88	26.98	28.57	62.67	0.00
College level (%)	23.08	22.22	26.37	14.67	
Professional, comprehensive school and other education (%)	35.04	50.05	45.05	22.67	
Mean duration of ownership (yrs)	4.98	5.62	5.62	5.53	
Counties by forest coverage (%)*:					
I group	31.93	38.89	23.40	17.33	0.00
II group	35.29	15.08	31.91	34.67	
III group	32.77	46.03	44.68	48.00	
Type of ownership:					
one person (%)	74.79	76.19	75.53	76.00	0.00
owner with co-owners (%)	25.21	23.81	24.47	24.00	
Residence of owner:					
reside in city or town (%)	64.71	44.44	38.71	81.33	0.00
reside in village (%)	35.29	55.56	61.29	18.67	
Mean forest area (ha)	13.37	14.97	6.92	9.86	
Mean distance from forest estate to residence (km)	44.7	35.4	18.5	58.5	0.00
Manner by which the forest estate has been acquired:					
by buying	27.35	21.60	11.70	25.68	0.04
by restitution through inheritance or gave given as compensation instead of other property (for ins. instead of agriculture land) and other cases	50.43	42.40	40.43	44.59	0.02
	25.64	37.60	43.62	28.38	
Conducting of silvicultural measures:					
yes	71.19	76.80	72.34	60.00	0.03
no	28.81	23.30	27.66	40.00	
Silvicultural activity index**	2.5	2.2	1.6	2.0	0.00
Forestry-related knowledge index***	0.93	1.2	1.2	0.9	0.02

* Counties by forest coverage: I group - Šiauliai (25.8%), Klaipėda (23.3%), Marijampolė (21.0%); II group - Tauragė (29.7%), Kaunas (29.1%), Panevėžys (27.2%); III group - Alytus (48.9%), Vilnius (43.6%), Utena (32.7%), Telšiai (32.7%).

** From 0=no activity, to 7=on average 7 different activity types (e.g. sanitary cutting, clear-cutting, reforestation etc.)

*** From 0=no any knowledge about forest management, to 4=a good knowledge about forest management

ha. 61.29% of the owners reside in villages. This group of owners has the smallest forest holdings and the closest residing proximity to a holding. Mean distance from forest estate to residence is 18.5 km. Mean age in this group is 55.4 years. 44.68% of owners who are ascribed to this group reside in the four most forested counties of Lithuania (Alytus, Vilnius, Utena and Telšiai). The mean time of possessing a forest holding is 5.62 years. However, the silvicultural activity index is lowest – 1.6. Forest owners representing this cluster are most passive comparing with other clusters. Even though the level of knowledge in the field of forestry is quite high, the forestry-related knowledge index is 1.2. 24.47% of forest owners possess their holdings with co-owners.

The cluster “*ecologists*” is represented by owners to whom the main ownership objective is nature preservation. This is the smallest cluster containing

75 owners. 62.67% of owners have a university degree. 52.0% of owners are women. The mean size of a forest estate in this cluster is 9.86 ha. 81.33% of owners reside in towns or cities and the average distance from a forest holding to an owners’ residence is 58.5 km. These are the furthest residing forest owners from their forest estates. Mean age of forest owners in this group is 50.3 years. 48% of owners live in the four most forested counties of Lithuania (Alytus, Vilnius, Utena and Telšiai). The average time of possessing a forest estate is 5.53 years. The silvicultural activity index is 2.0. Owners representing this cluster are moderately active comparing with other clusters. Even though the level of knowledge in the field of forestry is lowest, the forestry-related knowledge index is 0.9. 24% of forest owners possess their holding together with co-owners and 25.68% of forest owners of this cluster acquired their estate by buying.

Analysing the cluster characteristics identified the dominating factors of one or several owners' groups (Table 4). Seven factors with reliable distribution among clusters were identified: sex of owner, education, place of residence, level of forestry knowledge, forestry-related activity, distance from the residence to the forest holding and the manner of acquiring forest holding. In this article cluster characteristics are presented. For example, the greatest number (55 %) of the owners of clusters "businessmen" and "multi-objective owner" are men. On the contrary, clusters of "consumers" and "ecologists" hold the biggest share of women (more than 50 %) ($p=0.04$). More than 50 % of owners of "businessmen", "ecologists" and "consumers" clusters have university or college level education and owners of the "multi-objective owners" cluster might be characterised by the lower degree of education ($p=0.00$). Clusters also differ according to the owners' place of residence ($p=0.00$). More than 65 % of owners forming "businessmen" and "ecologists" clusters reside in the cities, while city residents of the other two clusters are only 39-44 % of the owners. Also owners of the clusters of "businessmen" and "ecologists" reside at the greater distances from their private forests. The results influencing to ownership objectives of the seven factors will be presented in other articles.

Links between grouping of forest owners and forest policy

The new *Policy of Lithuanian Forestry and its Implementation Strategy* was approved in September 2002 by the government of Lithuania. Forest ownership variety, the participation of society, development and strengthening of international relations, and efficiency of forestry activity and goals of rural development are all emphasized strongly in this Strategy. The Policy of Lithuanian Forestry and its Implementation Strategy defines the key instruments for forest policy implementation for the period until 2015. The detailed action plan for 2003-2006 of the implementation of these instruments is already prepared, and implementation has started. In Policy of Lithuanian Forestry and its Implementation Strategy a number of the objectives have been formulated for the private forest management problems solving: development of private forest owners training, consulting and education system; correction of non-rational boundaries between the forests of the state and the private sector through equivalent forest property exchanges; introduction of a compensation system due to the restrictions of forest utilisation in new established protected areas; integration of private forestry development into the general rural develop-

ment programmes supporting by EU; support from the state for private forest management.

The Ministry of Environment approved the Education, training and advisory programme for private forest owners in 2003. The main objective of programme is to create a basis for solid forest owner's education, training and advising system, which ensure SFM of private forests. In the programme the number of the goals have been formulated for the above-mentioned objective fulfilment. The Action plan for 2003-2005 consists 15 activities and means for programme implementation such as establishment of regional informational centres, publication of special education material and literature for private forest owners etc.

The forest owners "businessmen" should be associated with wood trade companies such as "Ekomediėna", "Jungtiniai miškai", which are members of Forest Owners Association of Lithuania. The main education and training subjects of these private forest owners should be value-maximizing harvesting policy, wood market tendencies, new harvesting technologies. For "consumers" more important subject is progress in use of wood fuel for heating. The favourable conditions for forest use focused on recreation and environment protection are important for forest owners "ecologists". The instruments supporting ecological forest management as well as the use of wood waste for biofuel are not incorporated into the new *Policy of Lithuanian Forestry and its Implementation Strategy*. "Multi-objective owner" are the most active in the forest management. All aspects of forest usage are important for this group of private forest owners.

The grouping of forest owners analysed in the article may be used for formation and implementation of private forest policy in the future. The results of this study suggest that strong emphasis should be placed on creation of the education, training and advisory system for private forest owners and existing forest policy should be focused on different groups of private forest owners.

Conclusions

The "multi-objective owner" cluster is characteristic of the owners having many ownership objectives. This is the biggest cluster. For the owners income from sold wood and non-wood products; wood and especially wood fuel use for their own purposes as well nature protection objectives are equally important. Owners of this group actively manage their forests, and have good knowledge in the field of forestry. Over half of the owners of this cluster reside in villages comparatively close to their forest holdings. These owners possess the largest forest holdings.

The second biggest cluster is named “*businessmen*”. The main objective is income generation from the wood. Characteristic feature of this cluster is that owners reside evenly in all regions of Lithuania. More than a half of the owners reside in cities and quite far away from their forest estates. Owners of this cluster most actively manage their forests; however, they have a low level of knowledge in the field of forestry. Consulting and education infrastructure should be orientated towards this group of forest owners.

The cluster “*consumers*” is the third biggest. The most important objective of owners belonging to this cluster is wood and non-wood products use for their own purposes. 61.29% of the owners reside in the countryside close to their forest estates. Due to it wood obtained for fuel from their forests is very important. More than a half (57.4%) of forest owners are woman. A characteristic feature of their activities is passive forest management and also income generation from wood and non-wood products is not their priority. By consulting and providing services to this group of owners most attention should be paid towards sustainable management balancing between economic, ecological and social factors. In the future this cluster will probably decrease due to the migration and the changing structure of forest owners.

The fourth cluster “*ecologists*” is the smallest. The main objective of these owners is nature preservation. Owners have the highest level of education. The greatest part of owners resides in cities (81%) and their forest properties are located the furthest distance away from their residences. Almost half (40%) of the owners from this group do not conduct any management activities in their forests. They also have the lowest level of knowledge in the field of forestry. These are typical residents of the cities and towns and they mostly use their forest for the recreational purposes. For owners of this cluster income generation from wood and non-wood products is not important, however, they still quite actively manage their holdings. In the future this group of owners will probably increase due to the improving level of life and also by the changing structure of forest owners.

The grouping of forest owners analysed in the article may be used for formation and implementation of private forest policy in the future. The results of this study suggest that strong emphasis should be placed on creation of the education, training and advisory system for private forest owners and existing forest policy should be focused on different private forest owners groups.

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ТИПИЗАЦИЯ ЧАСТНЫХ ЛЕСОВЛАДЕЛЬЦЕВ ЛЕСОВ ЛИТВЫ НА БАЗЕ АНКЕТНОГО ОПРОСА

Д. Мизарайте, С. Мизарас

Резюме

В Литве имеется 231 878 частных лесовладельцев (01 01 2005). Они различаются по площади лесовладения, месту жительства, возрасту, полу, образованию, социальному положению. Все это обуславливает их цели и проблемы. Несмотря на большое разнообразие в области отношения частных лесовладельцев на ведение лесного хозяйства в своих лесах, их можно разделить на гомогенные группы. На основе анкетного опроса частных лесовладельцев и, пользуясь кластерным анализом, были идентифицированы 4 группы лесовладельцев: (1) бизнесмен, (2) многоцелевой лесовладелец, (3) потребитель, (4) эколог. Приведены характеристики каждой из групп.

Ключевые слова: лесовладелец, анкетный опрос, кластерный анализ, группы лесовладельцев