

Scientific report on the implementation of the project for the second reporting period

1.01.2016-31.12.2016 ¹

Project PN II-RU-TE-2014-4-0017, Contract 286/2015: *Social acceptability and sustainability of biomass production and utilization in Northern Eastern Romania (Biomass)*

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1. Background

Romanian forests have great potential in terms of production of biomass for energy and industrial uses. Until a few years ago, the use of biomass was directed mainly to domestic use through direct combustion for heating and cooking, accounting for about 95% of the biomass harvested, while the industry represented only 5% (Roland Bergers, 2010). Policies meant to stimulate energy production from renewable sources led to the development of production capacities of energy from round firewood, reaching in 2015 a consumption of nearly half a million cubic meters. This came amid a consumption of firewood estimated 12 million m³ (3.75 million tonnes of oil equivalent - Romania's energy strategy updated) or 20 million m³ (19 million tonnes in Study INS on energy consumption in households, 2009) while official production of wood Romania in 2008 was 16.7 million m³ and 18.1 million m³ in 2015. During the same period, the volume of firewood registered as harvested roundwood was 3.7 million m³, respectively, 5.1 million m³ (National Institute of Statistics, 2016 Tempo Online), while the volume of imports of roundwood was under half a million meters cubic in 2008 and exceeded two million cubic meters in 2015. It is noteworthy that the demand for firewood is inelastic and has the particularity to increase in difficult economic conditions (economic crisis) because cheaper firewood, purchased legally or illegal replaces more expensive fossil fuels used for heating.

On the other hand, in the last decade, a group of large wood industrialization companies invested in Northeastern Romania and completely changed the demand for timber

regionally, affecting also the segment of firewood for the rural population in two ways: by directly accessing to the resource through auctions and by using waste wood as raw material for sawmills. Changing the Legislation regarding timber sale and policy implementation on reducing illegal logging, with a drastic change in the forestry law offenses in October 2016 marked a move towards more transparent flow of timber coming out of the woods. The side effect was the reduction of firewood in the market as it travels generally undocumented provenance.

2. Objectives of the second project period

The overall objective of this project is to evaluate the current model of social sustainability of the resource allocation in the production of wood biomass.

The second phase of this project had the following specific objectives:

- 1) Acquisition and processing of data relating to biomass resource and economic agents involved in the use of biomass in order to establish resource indicators;
- 2) Assessment of demand for biomass in seven rural communities and demand for biomass in the county of Suceava;
- 3) Investigate the social perception of the inhabitants of rural communities on cultivation for industrial purposes - biomass energy;
- 4) Identify institutional models supporting the demand for firewood in the communities.

3. Activities undertaken and results achieved

3.1. Indicators of biomass resource

The activities proposed for this first objective were: **Using online resources and access to databases of the National Institute of Statistics and the National Forest Inventory in order to define indicators of resource. Harmonizing data collected by those in silviculture and other forest domain specific databases.**

Based on existing data (free online) and those purchased within the project of the National Institute of Statistics, based on data Inventory National Forest and those of the Association of Foresters of Romania (ASFOR), as well as forest management from the districts forestry in Suceava and statements made by forest Guards were formed three specific database:

- 1) Database to assess the potential demand of wood at the district level.

For 42 entries (individuals = counties) were recorded the following variables:

| | | | | | | | | | | | | |
|--------------|----------------|-------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|
| CP_vol um | CP_Nrfir me | Spr_p ad | Spr_p riv | Sup_r as | Sup_ foi | Vol_ tot | Vol_r as | Vol_f ag | Vol_ ste | Vol_il og | nbfir me | pct_ caf |
|--------------|----------------|-------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|

Where:

CP_volum: volume certified for operation in m³
 CP_nrfirme: the number of companies approved for harvesting operations;
 Spr_pad: Forest area;
 Spr_priv: Forest area private (individuals and businesses);
 Sup_ras: The area occupied by conifers, ha;
 Sup_foi: The area occupied by deciduous forests, ha;
 Vol_tot: total volume harvested in 2015 m³;
 Vol_ras: coniferous volume harvested in 2015 m³;
 Vol_fag: Beech volume harvested in 2015 m³;
 Vol_ste: Oak volume harvested in 2015 m³;
 Vol_ilog: volume of illegal logging in 2015 m³;
 Nbfirme: the number of operating companies representing 20% of total segment logging companies in the respective county (Pareto index);
 Pct_caf: percentage of turnover total for above firms (Pareto index).

We have calculated correlation coefficients and coefficients of rank correlation. Dendrogram cluster analysis was performed for the potential demand and we have analyzed the main components to explaining correlations between variables considered.

The results are presented in the article submitted for publication by Bucovina Forestiera, entitled **Attributes structural of wood demand for the wood industry**.

2) Database to identify structural attributes of wood resource allocation at national, regional disparities and development regions

The methodological line used to compile this database was the one intended in the project, according to which variables that were sought to make explicit a number of indicators were chosen according to the Ostrom scheme IAD (Institutional Analysis and Development framework).

Thus, the database is constituted of 76 indicators, structured in resource indicators (**Physical Conditions - Resource assessment**), indicators of community (**Attributes of the community - The intensity of land use, Industrial Demand, Energy demand for households**) and indicators of social assessment of forest resource, and is structured as in the excerpt presented bellow:

| Unit | Indicator |
|-------------------------|--------------|
| Ha | St |
| Ha | Spad |
| Ha | SPadR |
| Ha | SPST |
| Ha | SPriv |
| % | PStat |
| % | Ppfiz |
| Ha | SVF |
| thousand m ³ | VEXT |

| | |
|----------------------------|---------------------|
| thousand m ³ | VexR |
| thousand m ³ | VexF |
| thousand m ³ | VexST |
| thousand m ³ | VexDT |
| thousand m ³ | VexDM |
| m ³ | VTI |
| ha / person | DResHa |
| m ³ / place | DResVol |
| m ³ / loc.rural | DResVolRural |

In setting up the data we have considered a number of resource based indicators that will be analysed in conjunction with indicators characterizing the community and with social indicators. An article is under development on the topic: Resource and community-based patterns of forest resource allocation in Romania.

3) database to identify the characteristics of timber allocation in Suceava county.

| Area of forest fund DS administered by Suceava | | In which the regulating surface Wood production (excluding TI and TII) | | Sale leg APV gross volume (mc) | Providing services APV gross volume (mc) | own band APV gross volume (mc) | Total (1 + 2 + 3) (mc) | volume sold the assortment industrial * | volume sold as firewood | Nr. economical agents who contracted 2015 ml per foot | Nr. economical agents who contracted 2015 service |
|--|-----------------|--|-----------------|--------------------------------|--|--------------------------------|------------------------|---|-------------------------|---|---|
| State FF | Administered FF | State FF | Administered FF | | | | | | | | |

The database consists of data from Suceava county forest management plans and from timber selling acts. The database provides information to estimate the demand for biomass in the county (second objective of the year 2016).

3.2. Assessing demand for biomass in seven rural communities and demand for biomass in the county of Suceava

Activities undertaken to achieve the second objective were: **Defining the target population, establishing a questionnaire, test it and implementing it; 2.2. Data analysis.**

Seven locations (centers) were selected in such a way to be representative in terms of the distribution areas of relief and rural/urban, taking into account the sampling practiced in a similar study conducted in 2009 by the National Statistics to estimate energy consumption in households. INS survey included a sample of 10,920 homes in 780 centers, with 14 homes per center. The method of estimating the demand for firewood consisted of a survey in the seven centers chosen on a systematic selection scheme with random start (one street chosen randomly selected localities) and pitch (a house of four), with at least 40 central housing. The survey was weighted so that it is in agreement with the structure of the population, the geographic variables and number of inhabitants in rural / urban areas (Figure 1).

The questionnaire was developed to provide the following information: estimating consumption of firewood per household and the cost of heating with wood, including costs after the purchase; identify the type of wood used; identification of procurement practices (seasonal supplier, amounts, illegal theft); record consumer perceptions and opinions of firewood on the present system of trading / supply firewood; identification of explanatory variables of firewood consumption (household area, number of rooms, number of family members, the number of people recorded revenues).

After pre-testing the questionnaire on a number of 16 respondents in a village in Neamt County we have slightly changed some questions to improve the clarity of expression. The questionnaire contains 20 questions in total, most with three to five answers, with only two free response questions.

Implementing the questionnaire in the selected localities covered the period from January to November 2016, resulting in a total of 349 questionnaires according centralizer below (Table 1).

Table 1. Synoptic questionnaire for the estimation of the firewood demand

| Nr. crt | Village / city | County | Nr. population | Nr.Househo-Release | Nr. the average person.household | Landform: deal [1] mountain [2] plain [3] | | | fold forest | Ethnicity (nr.locuitori) | | | | No questionnaires completed |
|---------|-----------------|----------|----------------|--------------------|----------------------------------|---|------|---------|-------------------|--------------------------|-------------|-------------|------------|-----------------------------|
| | | | | | | Romanian | Roma | unknown | | more | | | | |
| 1 | Borca | German | 6148 | 2355 | 2.57 | | 2 | | OS Borca | 5787 | 211 | 148 | 2 | 16 |
| 2 | Lower Partestii | Suceava | 2778 | 980 | 2.81 | 1 | 2 | 3 | OS Solca | 2625 | 110 | 37 | 5 | 60 |
| 3 | Mihai Eminescu | Botosani | 6954 | 2337 | 2.91 | 1 | | | OS Mihai Eminescu | 6663 | 5 | 279 | 7 | 79 |
| 4 | hunters | Iași | 4624 | 1515 | 2.98 | 1 | | | OS Pașcani | 4447 | 44 | 129 | 4 | 40 |
| 5 | Copălău | Botosani | 4053 | 1317 | 3.03 | 1 | | | OS Flămânzi | 3866 | 86 | 101 | 0 | 60 |
| 6 | Wah | Suceava | 14429 | 5667 | 2.41 | | 2 | | OS Wah | 13386 | 95 | 856 | 92 | 60 |
| 7 | Dolhasca | Suceava | 10298 | 3342 | 2.92 | 1 | | 3 | OS Dolhasca | 8512 | 1258 | 528 | 0 | 50 |
| | Total | | 49 284 | 17513 | 2.81 | | | | | 45 286 | 1809 | 2078 | 110 | 349 |

The number of questionnaires is considered appropriated to represent the total population. Thus, at a coverage probability of 95% and an error of $\pm 5\%$, the size of theoretical sampling for the total population of 17513 households is 370 respondents.

The data analysis included the analysis summary (synoptic) on consumption; regression analysis between different variables (socio-demographic and consumption); multivariate analysis correlation and principal component analysis to identify variables that discriminate best responses and respondents. Figure 1 compares some results of the questionnaire with the results from the National Institute of Statistics in 2009 on energy consumption in households.

Preliminary results of the study suggest that the consumption of firewood reaches nearly 1 million cubic meters, if we rely only on the number of inhabitants in rural areas (Table 2). Given that firewood is also used in some cities (Gura Humorului, Campulung, Vatra

Dornei), we consider that one million cubic meters of firewood consumption per year in the county of Suceava is a reasonable estimate.

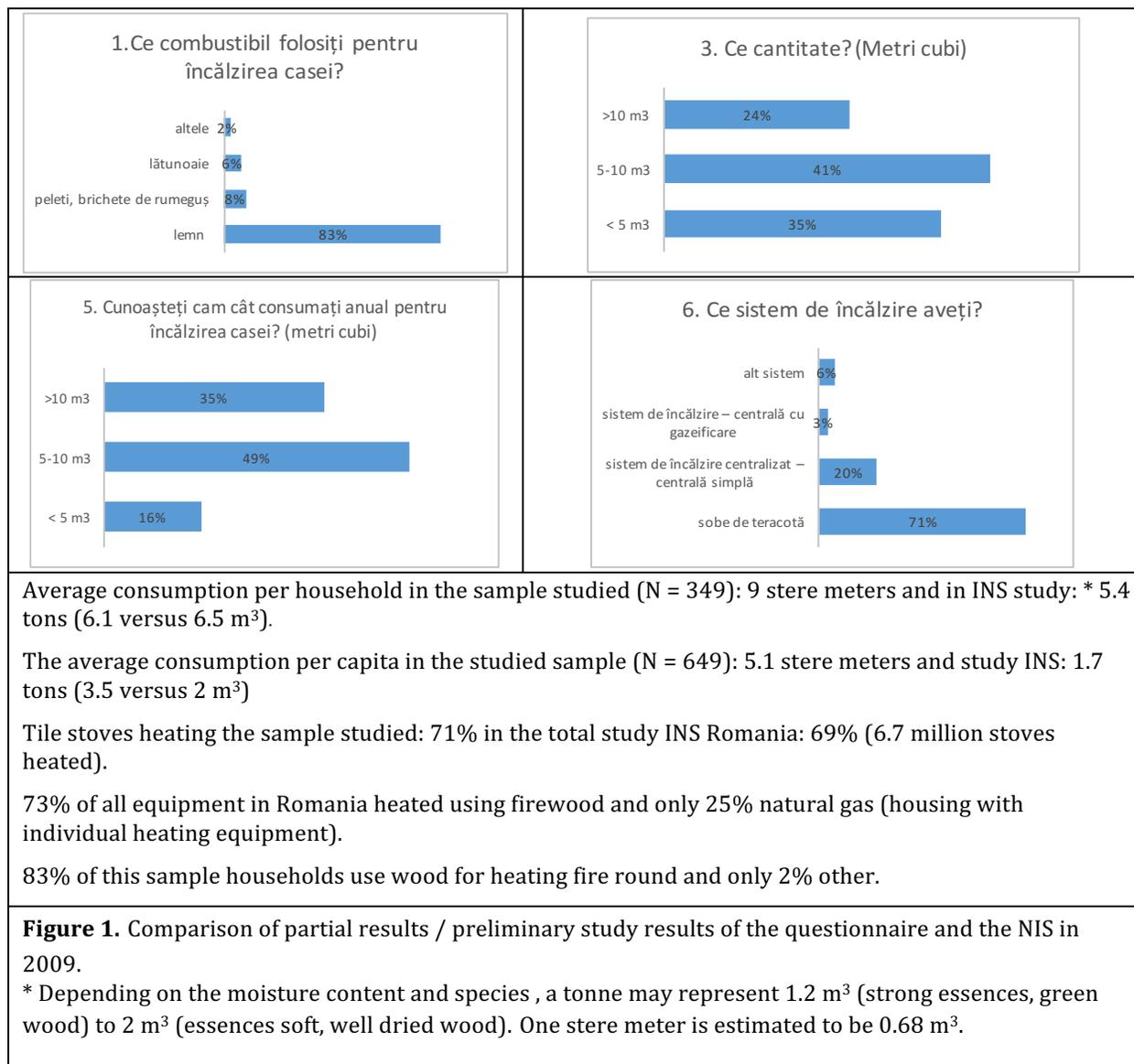


Table 2. Estimated consumption of firewood in Suceava using average values and average of NIS biomass study

| Indicator | Value for Suceava, NIS | Average consumer study NIS in tons * | Suceava total consumption value, according to NIS averages in tonnes | Averages consumption, biomass study in cubic meters | Suceava total consumption value in cubic meters |
|--------------------------|------------------------|--------------------------------------|--|---|---|
| Rural population, number | 372.797 | 1,7 | 633.755 | 3,47 | 1293606 |

| | | | | | |
|----------------------------|---------|------|----------------|------|---------------|
| Number of rural households | 151.609 | 5,44 | 824.753 | 6,12 | 927847 |
|----------------------------|---------|------|----------------|------|---------------|

For comparison, the Suceava Forest Directorates, a territorial branch of Romsilva, which manages 411398 ha out of total 443796 ha of Suceava county forests (i.e. 92%) reported in 2015 a total volume of timber of 1258689 m³ (Database 3). The assortment of firewood pulled itself up for sale was only 139000 m³ (approximately 10%). In total, in Suceava county, the maximum amount of timber authorized for harvesting was up to 2.4 million m³ (Table 3).

Table 3. Volume of timber, by forest ownership, harvested in 2009-2015 in Suceava (Suceava ITRSV, Environmental Status Report, 2015)

| Ownership of forest | Volume of timber harvested (thousand cubic meters - gross volume) | | | | | | |
|--|--|-------------|-------------|-------------|-------------|---------------|---------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| State public property | 1341 | 1218 | 1337 | 1292 | 1311 | 1333 | 1300 |
| Public property of administrative-territorial units (municipalities) | 390 | 401 | 373 | 345 | 325 | 299,1 | 265 |
| Private property | 554 | 631 | 656 | 732 | 601 | 540,9 | 438,3 |
| Forest vegetation on land outside the forest | 39 | 65 | 108 | 183 | 203 | 184,4 | 179,5 |
| TOTAL | 2324 | 2314 | 2474 | 2552 | 2440 | 2357,4 | 2182,8 |

Table 4. Potential supply of firewood

| Ownership of forest | Volume of timber harvested (thousand cubic meters - gross volume) - 2013 | Estimated to be sold as firewood * | Potential volume valued as firewood (thousand cubic meters) |
|---|---|------------------------------------|--|
| State public property | 1300 | 20% | 260 |
| Public property of administrative-territorial units | 265 | 30% | 79,5 |
| Private property | 438,3 | 50% | 219,15 |
| Forest vegetation on land outside the forest | 179,5 | 80% | 143,6 |
| TOTAL | 2182,8 | | 702,25 |

* Estimated by consulting the official data and through discussions with forest engineers

If we consider that a third of the total harvested volume is sold as firewood (i.e. around 700000 m³, as calculated also in the Table 4), we acknowledge a gap of at least 300000 m³ between the supply and demand of firewood for Suceava county. Given that virtually 92% of Suceava forests offer only a third of the potential demand for firewood, it can be inferred that the pressure for purchasing firewood from other forests than those managed by the Forestry Division is extremely high, or that the firewood is obtained by illegally harvesting. In 2015 the volume of illegal stealing of trees in Suceava County was officially of 20,000 m³, and the total volume of timber seized by the authorities was 22523 m³. Based on the annual deficit of firewood (gap between the supply and the demand), we may

advance the hypothesis that the controlling activities allowed the identification of only 10 to 20% of the timber stolen from forests.

These preliminary results take into account only the demand for household consumption in rural areas and assumes a minimum consumption of waste wood, considered to be mostly absorbed by the energy and particle board production plants located in Radauti. The results do not include the supply of firewood from external sources (e.g. import from Ukraine). Also, supplementation with wood from other counties was excluded from the calculation, although it probably occurs. But we estimate that supplementation with firewood brought from other districts is offset by outflows of wood towards less forested counties (Botosani, Iasi), as coming out from the undertaken interviews.

3.3. Investigating the social perception of the inhabitants of rural communities on cultivation for industrial purposes - biomass energy

The specific activities of this phase were: defining the target population, establishing a questionnaire, test it and implement it; analyse the data; compare the results with existing study on the intensive culture of poplar for biomass production (Cosofret et al., 2016: DOI: 10.4316 / bf.2016.005).

The results obtained in previous research projects (project Stroma: Sustainability crops short rotation forestry production on land outside the forest, Project PNII-PTPCCA-2011-3.2-1574) clarified the perception of residents of the Depression Radauti, Suceava County (N = 98) on poplar cultures on former farmland. In this research project, we have focused on other species than poplar, with potential for biomass production. The black locust and the Norway spruce were chosen because they are generally known by the potential respondents. Therefore we could eliminate the cognitive effect or lack of information about some less known species, such catalpa or other exotics biomass producing species. The target population was represented by residents of six villages in the county of Galati (widespread presence of black locust) and a village in the county of Suceava (Panaci - widespread presence of spruce).

The questionnaire implemented in poplar case study (Cosofret et al., 2016) comprising 22 questions was adapted for these two species in order to ensure the comparability of results. In this study, a number of 79 questionnaires were made within six localities of the Forest District Galati from Galati county and a total of 37 questionnaires in a local mountain village (Panaci) in Suceava. In the Forest District Galati, black locust afforestation of degraded land is driven by the need to re-establish windbreaks belts, which constitutes a common landscape in the district area. In the Panaci village, the evolution of land use shows a significant decline in grassland area due to abandonment of agricultural practices and the natural afforestation with spruce.

The first part of the questionnaire (questions 1-6) recorded the views and preferences of residents about afforestation and forest. Questions 7-15 registered the respondents preferences about the landscape and the local traditions under the pressur of widespread planting of black locust or, respectively, of the spruce natural invasion on the

grasslands. The questions from the last part of the questionnaire (questions 16-22) aimed to describe the individuals' subjective perception in relation to a series of demographic and socio-economic variables. Most of the questions use Likert scale with five graduations to record the agreement or disagreement intensity. In the graphs below (Figures 2, 3, and 4) we have compared the responses from four questions of our questionnaire.

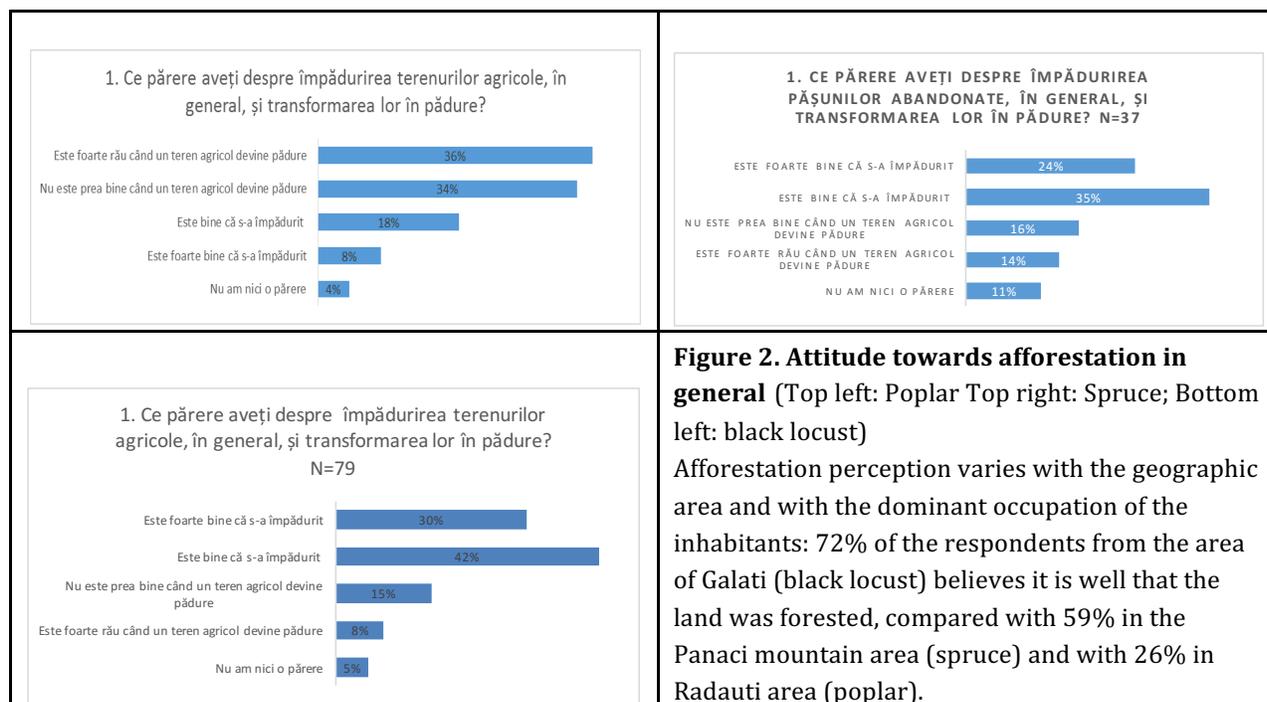


Figure 2. Attitude towards afforestation in general (Top left: Poplar Top right: Spruce; Bottom left: black locust)

Afforestation perception varies with the geographic area and with the dominant occupation of the inhabitants: 72% of the respondents from the area of Galati (black locust) believes it is well that the land was forested, compared with 59% in the Panaci mountain area (spruce) and with 26% in Radauti area (poplar).

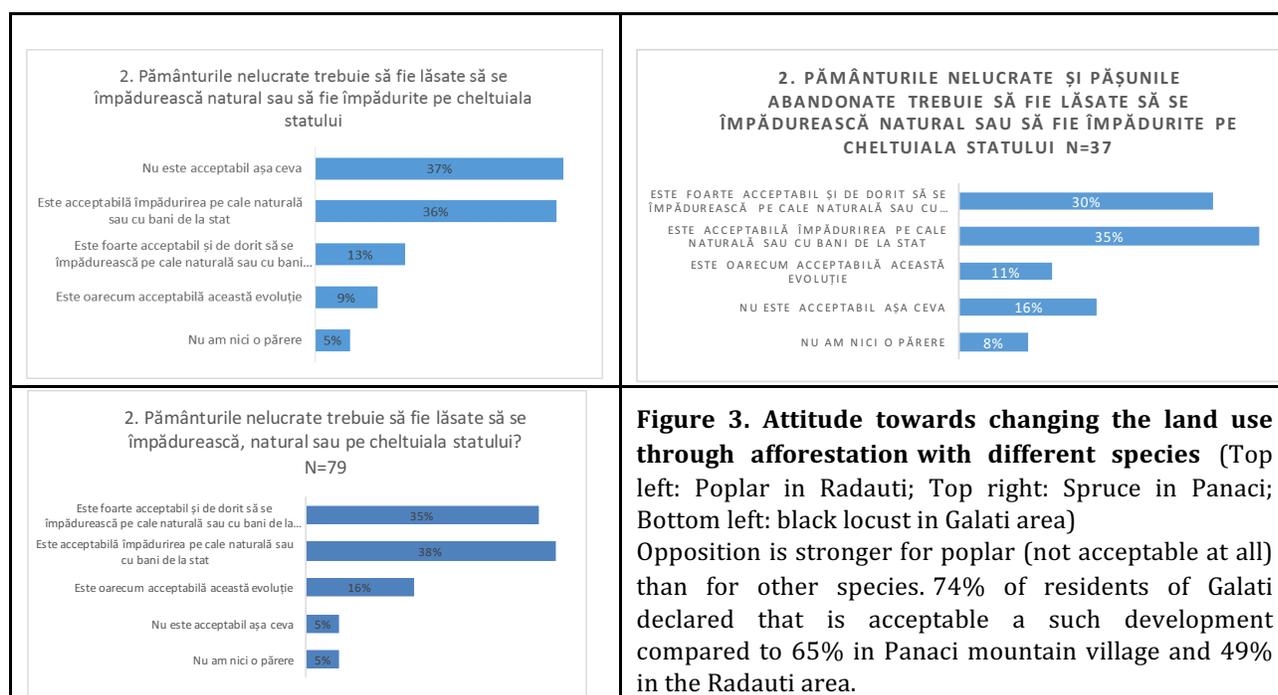


Figure 3. Attitude towards changing the land use through afforestation with different species (Top left: Poplar in Radauti; Top right: Spruce in Panaci; Bottom left: black locust in Galati area)

Opposition is stronger for poplar (not acceptable at all) than for other species. 74% of residents of Galati declared that is acceptable a such development compared to 65% in Panaci mountain village and 49% in the Radauti area.

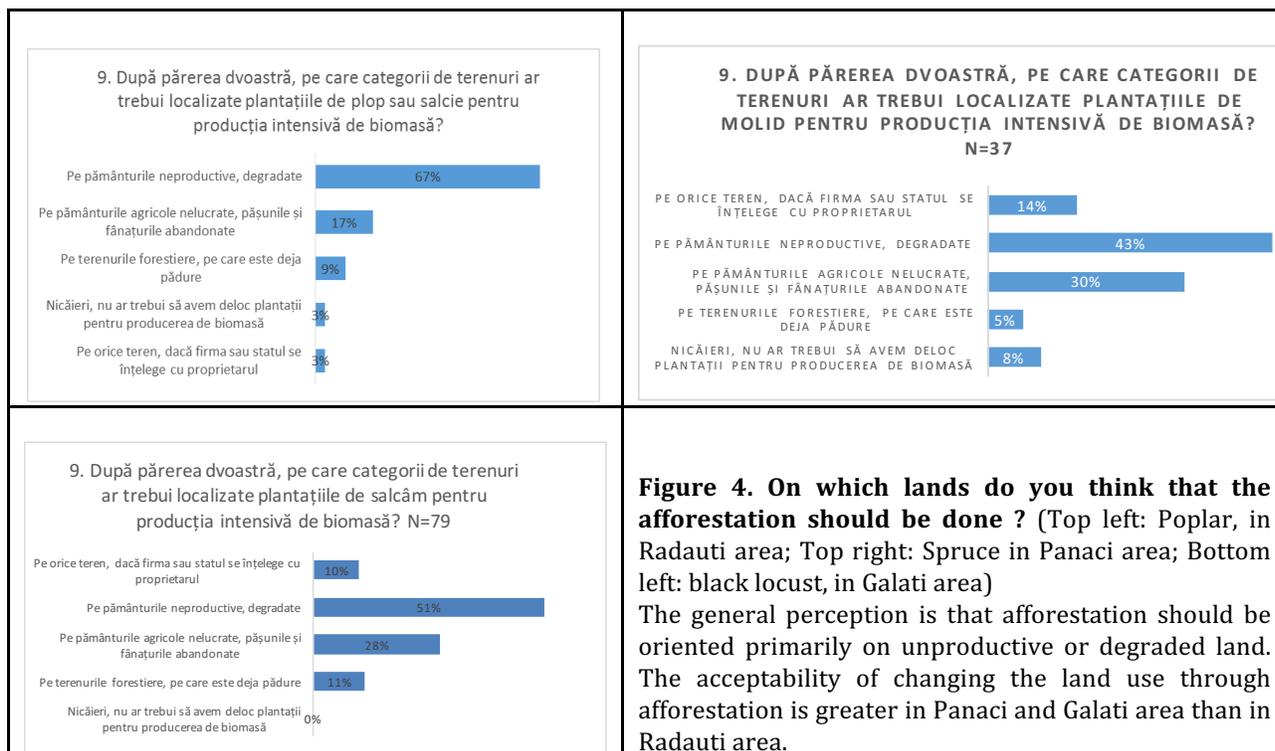


Figure 4. On which lands do you think that the afforestation should be done ? (Top left: Poplar, in Radauti area; Top right: Spruce in Panaci area; Bottom left: black locust, in Galati area)

The general perception is that afforestation should be oriented primarily on unproductive or degraded land. The acceptability of changing the land use through afforestation is greater in Panaci and Galati area than in Radauti area.

3.4. Identify institutional models supporting the firewood demand

The activities within this objective were focused on **identifying how the purchasing firewood, social networks and behavioural national rules involved in purchasing firewood by conducting interviews with businesses with operating activities and sales of firewood.**

The initial target population (economic agents, e.g firms) has been extended to include actors and interests in influencing public policy for the allocation of timber resources extracted from the forests of Romania. A number of 75 semi-structured interviews were conducted with respondents with diverse backgrounds (Table 5), 43 questionnaires with forest owners and 46 questionnaires with representatives of forest guards. Because the illegal logging was one of the main topic addressed in the interview, the interview protocol sets up several privacy rules, including that of not disclosing the forest district in which the interviews were conducted. All interviews were transcribed, coded and classified according to the main themes coming out from the discussions.

The 43 questionnaires with owners of forest individuals from 8 locations randomly chosen in Suceava and Neamt were analysed in the broader context of a publication with researchers from abroad focused on "What is forest and forest management to forest owners in Europe " .

Table 5. The interviews realised within the frame of the project

| Nr.crt | Date | Location | Person | Topics covered in the interview |
|--------|----------------------|--------------------------|---|--|
| 1 | 12/10/2015 | OS, jud. Suceava | engineer landscape planner | Methods used in landscaping to facilitate illegal logging |
| 2 | 12/04/2015 | OS, jud. Suceava | Head of forest district | The effects of changing the Forest Code; Role of NGOs in helping detect illegal forest restitution; Schweighofer and encourage illegal logging issue by buying illegally harvested wood; The restriction of own production capacity 40% |
| 3 | 27/03/2016 | OS, jud. Suceava | Head of forest district | Changes to the OM1388; Local communities and their access to the forest resource as a "social problem"; Forest guards that control bodies; SUMAL views on the operation; The development of forest biomass; Development chopping machines used |
| 4 | 03/30/2016 | Jud. Suceava | Primary Processing Company Director | The development of forest biomass; Bioenergy policies impact on FIME; Illegal logging; forestry regulations |
| 5 | 03/30/2016 | Jud. Suceava | Primary Processing Company Director | The development of forest biomass; Simplifying conditions for the enhancement of the wood produced in intensive crops for biomass; forestry regulations |
| 6-50 | Dec. 2015- Feb. 2016 | OS anonymous survey area | 45 economic agents from a forest district | The impact of legislation to reduce illegal logging; Estimates of the volume of illegal logging; Description of the reasons and illegal logging practices before and after their SUMAL measures; Practice adjusting to tougher legislation |
| 51 | 18/04/2016 | Bucharest | Representative Policy and Strategy Directorate, MMAPI | Ministry's position on the use of wood for energy Solving competition between the use of firewood for the population and the industrial production of energy |
| 52 | 05/12/2016 | Bucharest | Representative As. for Biomass | Using the forest resource to produce bioenergy Bioenergy development policies The risk of pressure on resources and communities |
| 53 | 05/12/2016 | Bucharest | Forest Guard representative | The pressure for firewood and illegal logging; The negative impact of policies on the use of firewood to produce bioenergy (industrial consumers versus households); Regional impact of the use of the resource to produce bioenergy |
| 54 | 06/01/2016 | Bucharest | Representative As. for Biomass | Availability of biomass resources for industrial use Assess the demand for firewood for the population; The effect of eliminating firewood as a resource for energy in industrial installations; The situation certificates of origin for forest biomass |
| 55 | 06/03/2016 | Jud. Suceava | General manager and administrator, bioenergy producer | The situation certificates of origin for forest biomass; The situation on biomass heat sector; The impact of changes in public policies on bioenergy; Competition in resource use, eg PAL / bioenergy / firewood |
| 56 | 11/07/2016 | Suceava | Advisor, MMAPI | Forest resource allocation; startegic vision Property form |
| 57 | 10/23/2016 | Forestry Department | Forestry Department Director | The influence of foreign capital companies on the development of the forestry sector; The impact of new regulations on the |

| | | | | |
|-------|------------------------|---|--|---|
| | | | | supply of firewood; Lack of policies of development time visibility; bureaucracy regulations |
| 58 | 10/27/2016 | Neamt. | Trader | Firewood in the company's portfolio; Competition / cooperation investors large / small businesses; More efficient use of wood |
| 59 | 03/11/2016 | jud. Iasi | Firewood trader deposit | Organizing the marketing of firewood and supplies; Competition / cooperation investors large / small businesses; More efficient use of wood |
| 60 | 10/11/2016 | jud. Suceava | Trader | Organizing the marketing of firewood and supplies; Competition / cooperation investors large / small businesses; More efficient use of wood |
| 61-67 | Ian.2016- July 2016 | Jud. Suceava, Neamt Botosani, Iasi | Forestry engineers from six communities studied in the questionnaire | Organizing the marketing of firewood and supply across the forest district. Possibility of firewood to the district. Problems in compliance exploitation and transport of timber |
| 68-75 | Ian.2016- July 2016 | Jud. Suceava, Neamt Botosani, Iasi | Trader for six communities studied | Firewood in the company's portfolio; Competition / cooperation investors large / small businesses; Access to wood resource; Problems in compliance exploitation and transport of timber |

The institutional models research area is currently split up in three directions of investigation:

- Allocation model resource from the perspective of the owner of the forest (manuscript prepared by Feliciano, Diana, Laura Bouriaud, Elodie Brahim, Philippe Deuffic, Zuzana Dobšinská, Vilem Jarsky, Anna Lawrence and Andrej Ficko. **How do private forest Owners understand forest management? Evidence from a survey in seven European countries.** *Land Use Policy*, Accepted, in revision);

- Allocation model resource from the perspective of forest-dependent communities (manuscript prepared by Mikulcak, Friederike Andra Ioana Milcu, Laura Bouriaud, Joern Fischer. **Who benefits? Power struggles around forest resources in post-socialist Romania?** *Forest Policy and Economics*, Accepted, in revision).

- Behavioral norms in procuring illegal timber (45 interviews with traders within a forest district in the studied area, and two publications submitted: Stefan, Gh., Bouriaud, L. Assessing the volume of uncontrolled trees cutting through multi-annual monitoring in sample plots, Forest Bucovina, accepted, in revision; Bouriaud Laura. **Understanding the lack of change in the Policies against illegal logging,** *Global Environmental Change*, Submitted).

The analyses carried out showed:

- how the present legal framework determines the resource allocation (Bouriaud, et al., 2016. Romanian legal limit wood production management rules in Norway spruce and beech forests. *Forest Ecosystems*);

- how the material competence is defined in law and determine the administrative control over the use of the forest resource (Book chapter in Monteduro, M., coord.: Bouriaud, L., 2016. Forest definition in the Legislation and case-law in Romania, in revision);
- which could be ethical consequences of the existing model applied in land use and production of biomass (Cadet et al., 2016. Ethical Consideration Concerning the changing of land functions, Globalization and National Identity Intercultural Dialogue, Vol. III, 2016 p: 334 -344; Boboc et al, 2016. Social and Ethical Challenges of Using biomass - a Renewable Energy source, SEA, Vol. IV, Issue 3 (12), 2016, p: 479-484).

4. Impact of scientific and professional environment

One of the main outcome of the project was the participation to the working group for drafting Ministerial Order no. 1534 of July 28, 2016 on the certificates of origin for biomass from forestry and related industries and used in the production of electricity from renewable energy sources. To this end, we have established information materials (synthesis) to the attention of group members on the fact: 1) that the resource forest exploited legally does not cover the demand of the population for firewood as calculated by the National Institute of Statistics; 2) that the whole tree harvesting to maximize the extraction of biomass from forests, practiced on large scale in some Nordic countries, lead to a loss of productivity; 3) that timely conducted thinning in the stands represents a positive aspect of forests adaptation to climate change and also enable an increased supply of wood for energy production; 4) that the existing studies recommend the use of forest biomass for energy production only if avoiding long-distance transport (amplified thus the carbon emissions by burning fossil fuels); therefore it is necessary to plan the location of cogeneration plants.

One result of the participation to the working group was the simplification of the administrative procedures required for harvesting timber from energy plantations grown on agricultural land for intensive production of biomass. Another result was to bring to the attention of policymakers the issue of firewood consumption by households, largely ignored so far, including in the Romanian energy strategy for 2007 - 2020 updated for the period 2011-2020 .

One other result brought into the attention of the policy makers (Bouriaud et al., 2016) shows the impact on forestry regulations on the productivity of the forest stands. The study proves that the productivity of trees is severely affected in forests that are used for timber production (the study excludes forests under protection or protected) by three factors: the lack of pre-thinning and thinning works, the production cycle very long and the waiting period of 25 years preceding the beginning of harvests. The average volume per ha in Germany is 50% lower than in Romania, but higher harvest rates in Germany has practically doubled the amount of wood produced in Germany stands compared to that produced in Romanian stands. It appears that the higher stocks in Romanian forests contribute less in mitigating climate change than the additional yield achieved in

Germany. The effect of substitution of fossil fuels is much lower in Romania than in Germany.