

# Opportunity of small-scale forestry in Moldova

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## ABSTRACT

Moldova is a country of narrow space, with a few forests that cover 325 thousand ha. All forests are owned by public, with 90% owned by state forest authority and 6% owned by mayoralties. The remaining 4% of the forests are owned by agricultural unites, cities, industry, transport and aquatic branches. Forests belong to the first functional group, having the exclusive function to protect water, soil, and forest genetic funds; to annihilate harmful climatic and industrial factors; to provide recreation function and scientific interest. Protected areas occupy 66467 ha, of which forests occupy 59495 ha. The major tree species that make up the forests in Moldova are pedunculate oak, sessile oak, downy oak, black locust, European ash and hornbeam. In the national economy, forest products represent 0.3-0.4% of the Gross Domestic Product. The main task of forest sector to extend forest area from 9.6 to 15% concentrated during last twenty years huge financial and people resources and became a topic of many scientific disputes and social conflicts. We suppose that inadequate forest ownership is the main reason that stagnate the afforestation objective. In the same time we are conscious that expropriations, chronic changing of the states, governments, moneys, with no compensation for the society during the last century lost the confidence of rural people in the land property rights. We believe that fragmentation of agricultural lands by small patches of private forests should be the main bridge between the past and future, poverty and economical stability. This paper will focus on opportunity of small-scale forestry in Moldova. First it describes the dynamic

of forest cover and the management of forest estate, secondly clarifies the opportunity of small-scale forestry and thirdly emphasizes potential specific features and diversification of small-scale forestry. Finally, the main objectives and actions in the base of studies are made in order to improve the opportunity of small-scale forestry.

**KEYWORDS:** small-scale, forestry, opportunity, conservation, resources, utilisation.

## INTRODUCTION

Concerning to The Dictionary of Forestry (Helms 1998), "agroforestry" is defined as a land-use system involving trees and other woody perennials "in crop and animal production systems to take advantage of economies or ecological interactions among the components"; nonindustrial private forestry (NIPF) is defined as "forest land that is privately owned by individuals or corporations other than forest industry and where management may include objectives other than timber production"; a definition of "community forest" is provided, as "a forest owned and generally managed by a community, the members of which share the benefits".

In Moldova the forest fund (11.4%) is highly fragmented and unevenly scattered in 57.6% of agricultural lands, among 1680 localities (9.1%), 17.8% of reserve fond occupied by pastures, and 1,8% of lands destined to transports. Forests comprise 800 bodies with a surface between 5 and 5000 ha. The main economical benefits come from wood selling, firewood being a greater part. Because of heavy grazing, poaching and other anthropogenic factors, non-wood products supplied

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by forests are comprised mostly from medicinal herbs, berries, hay and honey. Taking in consideration that all forests economically based on firewood are owned by public, but with a part of them utilised by community for grazing and hay collecting (for insignificant payment), we suppose that in Moldova we have a combination between nonindustrial but state forestry, agroforestry and community forest. In this context, from point of view of fragmentation, size of forest bodies, principal forest benefits we have small-scale forestry, while from the point of view of monopolistic system and hierarchical structure this is large-scale forestry. Because of this incompatible management forest practices could not have great potential to produce a wide range of forest products, create sustainable livelihoods and contribute to a stable and diversified local economy. As there is a great demand in Moldova to afforest 130000 ha on public barren lands we suggest that the same results of management incompatibility and low efficiency will be in the future.

Small-scale forestry systems differ in many ways from industrial systems, in aspects such as motivations for establishment and management, basis for species selection, social and economic objectives of key stakeholders and the likely markets for products. In this respect community forestry shares many similarities with farm forestry. The term usually adopted for small-scale forests in the USA is non-industrial private forests (NIPF). These are usually thought of as forestlands owned by farmers, other individuals and corporations that do not operate wood-processing plants (Zhai and Harrison 2000 cited by Harrison, Herbohn, and Niskanen 2002).

## 1. SITE AND METHODS

Moldova is placed in the southern-eastern part of the European continent between Ukraine and Romania (45°28'–48°30' northern latitude and 26°30' - 30°05' eastern longitude). The total area 3384357 ha constitutes from 1951107 ha (57.6%) of agricultural lands, 307732 ha (9.1%) of localities lands, 603825 ha (17.8%) of reserve fond occupied by pastures, forest protected belts, roads, 59371 (1.8%) of lands destined to industry, transports

communications 386246 (11.4%) of forest fond, 2037 (0.1%) land destined to nature protection, and 74039 (2.2%) of water funds (Land cadastre of Moldova 2003).

The relief of the country is complex and variable. There are sharp changes of altitude within relatively short distances, with valleys or deep cliffs. The most obvious formations of this type are situated on the central plateau of Moldova–Codrii, reaching an altitude of 429.5 m. The annual average temperature is 8–10°C, while precipitation oscillates from 560 mm in the northern part of country to 380 mm in the southern part.

The country is divided administratively in 10 counties, 1 autonomous – territorial unit, 15 municipalities, 50 towns, 66 localities member of towns (municipalities), 663 villages (communities), 886 rural localities in the frame of villages (commune) all together 1680 localities. The population of the Moldova constitutes 3617.7 thousand inhabitants, the average density of population being 119 per km<sup>2</sup>; rural people 58.6% and urban people 41.4%; male 47.9%, female 52.1%; ethnic composition Moldavians 64.5%, Ukrainians 13.8%, Russians 13%, Gagauz 3.5%, Bulgarian 2.0%, Jews 1.5%, Byelorussian 0.5%, Germany 0.2%, Gipsy 0.3%, Polish 0.1%, other nationalities 0.6% (Statistic yearbook 2003).

In order to investigate and write this paper we completed historical analysis, reviewed documents and literature relevant to the territory now called Moldova. We then hypothesised that the forest use histories as reflected in ownership pattern and forest area affected the sustainable forest management. The study is interdisciplinary and therefore qualitative and quantitative data were linked. The qualitative data also helped the quantitative side of the study during design by aiding with conceptual development.

## 2. RESULTS

### 2.1. Forest cover and the management of forest estate

Geopolitical location of Moldova as passageway between Asia and southern Europe predisposed its territory to frequent warfare. Goths, Huns,

Gepidae, Avars, Magyars, Pecheneg, Cumanians, Tatars, Ottomans, Romans and Greeks invaded this area, which in the 13th century became a part of Mongol empire. As independent state, Moldova emerged briefly in 14th century under leader Bogdan, and fell under Ottoman Turkish rule in the 16th century. After the Russian-Turkish War during 1806-1812 years, the eastern half of Moldova (named from 1813 year Basarabia) between Prut and Nistru rivers was ceded to Russia, while part of Moldova from western part of the Prut river remained with Turks. Romania, which gained independence in 1878 year, took control of Russian-ruled Basarabia in 1918 year and was forced to cede Basarabia to former Soviet Union (fSU) in 1940. Before establishin of former Moldavian Soviet Socialist Republic, Stalin stripped three southern counties along the Black Sea coast from Moldova and incorporated them in the former Ukrainian Soviet Socialist Republic. Romania sought to regain Basarabia by joining with Germany in the 1941 attack on the fSU. However, Moldova was ceded back to Moscow when hostilities between fSU and Romania ceased at the end of World War II. On May 23, 1991, the Parliament of the Moldova declared its independence (Ojog and Sarov 2001).

Despite of many historical events happened in Moldova, the richness and high economic potential of its forests and wildlife was preserved until the beginning of 18th century. Voivode Dimitrie Cantemir demonstrated scientifically in his work "Descriptio Moldaviae" (1715) the valuable natural heritage of this area. The forests according to Professor Dokuciaev cited by Przemetchii (1923) that took in consideration the soil surface modified by forests, could cover in the past about 450 thousand ha, while according to other authors forest comprised about 500-600 thousand ha, if taking in consideration that forest covered also carbonated fallow soils, forest xerophytic chernozems, and alluvions (Tudoran 2001a). Ostianu (1951) quoted by Kravciuk (1966) mentioned that if to add also the area of the created ravines after landslides, than the temporary forest cover in the prehistoric times might be about 1 million ha. Comparing with actual forest cover it is evident that use of most of the forests in Moldova has been intensive and long. First statistics about

evolution of forest cover in Moldova issued in 1853 year indicated an area of 365150 ha (Tudoran 2001a). The collective of authors those elaborated the National strategy and plan for actions in the field of conservation of biologic diversity (2001) supposed that in 1812 forest covered 450 000 ha. The high deforestation in 19th century is evident from many statistics, while we guess that during 18th century forests suffered huge damages too. We ground this opinion on historic facts about Phanariot regime (1711-1812) described in (Ojog and Sarov 2001). This regime had been included also six wars between Turkey, Austria and Russia with duration about 23 years on the territory of Moldova and Romania that provoked colossal destructions and stagnated the economic development.

But particularly, forests in Moldova have been exploited since the beginning of the nineteenth century (Figure 1). The logging of primeval forests for Russian Marine from the Black See (Tkacenco 1961) took place in the same period with colonisation of Basarabia promoted by Russia during 19th century (Ojog and Sarov 2001). Hence during being as part of Russian empire, Basarabia was colonised with 27 Germans villages, 1 Swiss village, 30 Bulgarian villages, 11 Russian and Cassack villages, 2 Gipsy villages, and 16 Jewish villages, all together 124 villages, that account about  $\frac{1}{2}$  from the amount of big villages of Basarabia (Enciu 2002). Population increased from 240 thousands people in 1812 year until 2.5 million in 1912 year (Odud 1955 and Shelokov 1964 quoted by Averin 1960, 1969 and Uspenskii 1970). As the population grew and agriculture expanded, need in fuel for cooking and a source of raw materials for dwellings and other constructions increased. Furthermore, cattle were grazed in the forests, thus hindering their natural regeneration.

The general cadastre from 1850 year shows 365 150 ha of forest area or (8.2%), while already in 1896 year according to topographical survey, realised by Russian Geographical Military Institute, the forest fond held 251825 ha (5.6%), Oniskevici (1908), cited by Tkacenco, 1961. Consequently, during the same period several wildlife species, such as bear, moose, red deer, lynx, black grouse was completely disappeared. Transforming of steppe in agricultural lands led to

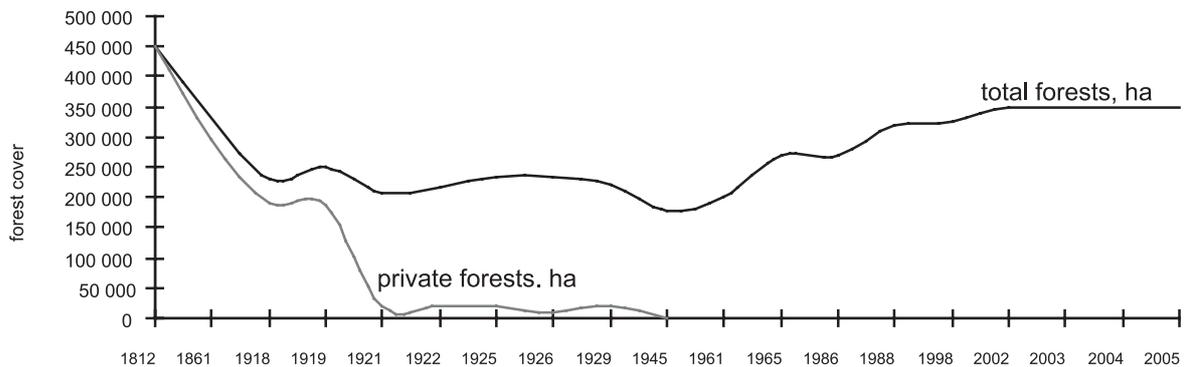


FIGURE 1. Variation of forest area during period 1812-2005

complete extinction of tarpan (*Equus gmelini*), *Saiga tatarica* and strepet (*Otis tetrax*) (Uspenskii and Lozan 1966). Forest cover was drawn down until 4.7% (207229 ha), including 183921 ha forests and 23 408 ha glades and barren grounds in 1921 year, according to statistic drawn up by Chisinau Forest Department; compared to 1895, surface of forest fund was reduced with 17.7% (Przemetchii 1923 quoted by Tudoran 2001a). Nevertheless, afforestation of 5625 ha during 1825-1914 years (Orlov 1895; Nikolischii 1883; Thvetkov 1957), and plantation of 4183 ha until end of 19th century (Chij 1864), could not restore huge damages caused by predatory forest logging (Tkacenko 1961). Simultaneously many forests were quickly transformed into arable lands, vineyards, orchards or pastures (Colpaci 1940; Przemetchii 1923, quoted by Tudoran 2001a).

From the union of Basarabia with Romania in 1918 year until 1936 year a surface of 20000 ha were planted (Colpaci 1936 cited by Tudoran 2001a), but later on again suffered huge damages during the costly and devastating Second World War that followed. Soviet armies applied in the period of retiring in 1941 year on the Basarabia territory tactic of burnt land; before the retiring in 1944 year was realized the same tactic by German and Romanian armies. As consequence forest cover decreased until 4 percent. One of the most tragic pages of history after Second World War was starvation in 1946-1947 years that caused the mass decline of population (150-200 thousands of people). From the May 1945 and to the autumn of 1946 the rains rounded the most part of Moldova territory. In the same time compulsory collecting of

cereals and forced collectivization of agriculture, those were priorities of Stalinist agrarian policy aggravated situation. Stalinist regime ignored economic contribution of peasants, considered their fidelity with regard to personal property as a threatening to system. Only during one night from 5 to 6 July 1949 were deported 10853 families to Siberia and Kazakhstan (Ojog and Sarov 2001). Hence a lack of food also increased the pressure upon the forests, which were devastated in many parts.

The principal directions of forestry sector in the second part of 20th century were vegetative regeneration and reforestation with acacia (*Robinia pseudoacacia*) species. Consequently forest cover increased until 271 300 ha (8%) in 1986 year and until 325 400 ha (9,6%) in 1993 year, which have remained in generally on the same level until nowadays. Due to above circumstances, the significantly disturbed age structure is constituted now from young trees - 26.3%, middle-age trees - 43.7%, prime-aged trees - 17.5%, and mature trees - 12.5%. Trees older than 100 years cover only 6000 ha (including 5000 ha of oak forest). Most of the forests are pure and even-aged that create difficulties to resist against pathogenic and abiotic factors (Gulca and Herbst 2005). Qualitatively, the forests of Moldova consist predominantly of broad-leaved trees (97.8%), Figure 2. This includes oaks (140.6 thousand ha; 43.2%), acacia (124.0 thousand ha; 38.1%), ash (16.6 thousand ha; 5.1%), hornbeam (9.4 thousand ha; 2.9%), and poplar (5.7 thousand ha; 1.8%). Coniferous species account for just 2.2% of forests (*Pinus silvestris* is dominant). The total growing stock is 35.14 million m<sup>3</sup>, or 8.1



FIGURE 2. Map of vegetation in Moldova (Atlas of physic and socio-economic geography of Republic of Moldova, 2005)  
 Forests of *Fagus sylvatica*;  
 Riverside stands; Halophytic meadowlands; Forests of *Quercus robur*; Forests of *Robinia pseudacacia*; Vegetation of stony substratum; Forests of *Quercus petraea*; Steppe; Forests of *Quercus pubescens*; Flooding meadowlands

$m^3$  of wood per capita. The wood mass per hectare is  $124 m^3$ . The forest sector supplies about 360 thousand  $m^3$  of wood mass per year to the national economy. Forests belong to the first functional group, having the exclusive function of environmental protection. The Strategy for Sustainable Forest Management (SFM), (nr.350-XV from 12 June 2001), provide for extending of forest area from 9.6 percent to 15 percent, restoration of the eco-protective and bio-productive potential of forests, and cease of forest destruction. The achievement of those goals can be ensured by adequate budget. As country's budget is very limited, promotion of private small-scale forestry is of vital importance.

## 2.2. Opportunity of small-scale forestry in Moldova

In the period of Roman domination (106-271) the majority of the forests were stated legally as public assets. During the centuries was much expanded monastery property, but also secular one of the big forest owners, obtained through donations, abuses, and other means. Thus, in the beginning of XIX century (Table 1) the majority of the forests were owned by monasteries, boyars, and free peasants; the state was practically absent in the forest property statistics (Giurgiu 2000). According to the first forest planning realised during 1860-1861 years, forest ownership comprised monasteries (15,9%), boyars and free peasants (76,1%), Bulgarian colonists (0,1%), and state (7,9%), (Postolache 1995). Concerning to statistics from 1925 year the state held 213 898 ha of forests, than 20 306 ha belonged to private owners (Tudoran 2001, b). The period after Second World War was characterized by entire state property over forests (Figure 2) and a planned economy as the basis of rational use of forests. Actual pattern of forest ownership in Moldova comprise state forest

TABLE 1. Evolution of the forest ownership

Holder	1812		1860-1861		1922-1925		1965		2003		2048	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
A. Private:	450000	100	292083	92.1	20306	9	0	0	0	0	406123	40
1. Monasteries	? *	?	50358	15.9	-	-	0	0	0	0	0	0
2. Boyars	?	?	241544	76.1	0	0	0	0	0	0	0	0
3. Free peasants	?	?			20306	9	0	0	0	0	406123	40
4. Bulgarian colonists	?	?	181	0.1	0	0	0	0	0	0	0	0
B. State:	0	0	25163	7.9	213898	91	306100	100	386246	100	609184	60
5. State forest authority	0	0	24672	7.8	213898	91	243200	79	354300	90.25	345600	34
6. Mayoralties	0	0	0	0	0	0	62900	21	18046	6.22	203061	20
7. Agricultural units	0	0	0	0	0	0	-	-	9400	2.39	9400	1
8. Cities and other localities	0	0	491	0.1	0	0	-	-	2400	0.61	49023	5
9. Industry and transport	0	0	0	0	0	0	-	-	1600	0.4	1600	-
10. Territory of aquatic fund	0	0	0	0	0	0	-	-	400	0.1	400	-
11. Other holders	0	0	0	0	0	0	-	-	100	0.03	100	-
Total Forest Fund	450000	100	317246	100	234204	100	306100	100	386246	100	1015307	100

authority (90.25%), mayoralties (6.22%), agricultural units (2.39%), cities and other localities (0.61%), industry and transport (0.4%), territory of aquatic fund (0.1%), other holders (0.035%). There is also forest vegetation outside the forest fund that includes 30700 ha of protective forest belts and 18000 ha of plantations of fruit trees and bushes. In Figure 3 is reflected an

intersection of state, mayoralty, transport and aquatic forest ownership.

The forest fund (11.4%) of Moldova is highly fragmented and unevenly scattered in or among 57.6% of agricultural lands, 9.1% of localities lands, 17.8% of reserve fond occupied by pastures, and 1.8% of lands destined to transports, (Figure 2). About 60% of the total forest area is



FIGURE 3. Intersection of state, mayoralty, transport and aquatic forest ownership in central part of Moldova, 2005 year

concentrated in the central region with 13.5 forest percentage, 26% is spread in northern region with 7.2 forest percentage, and 16% is dispersed in southern region with 6.7 forest percentage (Strategy for SFM, 2001). Forests comprise about 800 bodies (Vdovii et al. 1997) with a surface between 5 and 5000 ha (Tudoran 2001b). Consequently high forest fragmentation, pure and even-aged stands, traditional livestock grazing, poaching, and illegal logging made the forest sector decrease both from biodiversity and economical point of view. The main economical benefits come from wood selling (Caisin 2002), 75% from for the firewood and 15% from the timber (Popusoi 2002). In comparison, in Sweden during the 90th of last century wood had been used in generally 4% for fuel wood, 40% for pulp and paper, and 15% for sawn wood (Hägglund).

The principle of sustainable forest use, based on the concept of the natural distribution and age structure of plants and species, constitutes the guiding principle of the scientific organisation of forestry in the country (Kurk, Baginsky and Pobirushko 2003). That principle ensures not only continuous forest use equivalent to the natural annual forest growth, but also the economic safety and stability of the state, as well as maximum income from the different types of forest use. With a goal to restore natural forests and age structure in Moldova, the Strategy for SFM (2001) provided enlargement of forest cover at least to 15% or to afforest 130000 ha. This goal was determined also by, Law nr. 1041 – XIV from 15.06.2000 concerning improvement of degraded lands through afforestation, government decisions nr. 595 from 29.10.1996 and nr.107 from 07.02.2001 “Concerning approving of Program for land utilization and improving of soil fertility”, Strategy for Biodiversity Conservation (nr.112-XV from 27 April 2001) and multiple international conventions signed by Moldova (Convention on Biological Diversity, Rio de Janeiro 1992; United Nation Framework Convention on Climate Change, New York 1992 etc).

For afforestation, state forest enterprises have to convince mayoralities about temporary administration of some pastures or another degraded lands, and after the canopy will be created to return them back. But after planting, in

many cases rural people with a goal to maintain pastures for cattle, they pluck out saplings and after leave the cows for pasturing. During period of 2002-2004 the official average annual indicator of planting on degraded lands had constituted 7500 ha (22 500 ha), (Popusoi 2004). However from plantation to afforestation is long and difficult way especially in Moldova with dry climate, water shortage and grazing factor. Therefore the plans seem somehow pretentious also because the large surfaces of land became private property of peasants (Caisin 2002). The deadline to plant 130000 ha varies in some legislative documents from 2010 until 2025 year, also the same goal was stipulated by legislation in 70th of last century. In our point of view the actual impediments for successful planting are conflicts between extension of forest area and maintaining of pastures for rural people and between afforestation and land privatization (as almost finished measure). Moreover these conflicts will become gradually keener simultaneously with increasing of forest area.

Although behind these conflicts are situated principal occupations of rural people (agriculture and livestock farming) and presence of natural resources. Number of domestic animals and pasturing damage had increased as consequence of artificial colonisation in 19th century. During last fifteen years we have had considerable reduce of cattle per country, but this not reduce damage to the forests and wildlife. The reason is that after independence receiving in 1991, almost all livestock industry was destroyed and rural people practically with lack of salary have used the livestock as principal source of food and income. Consequently rate of number of domestic herbivores in the farms of individual sectors from the total over Moldova have increased significantly.

These conflicts are based on historical facts and legislative acts. The historically formed traditions and realities are almost impossible to change during a short period, while elected representatives by local people make legislative acts. Opposite to importance of private forests in new economic conditions have been discouragement and distrust to create them during independence period. For instance Article 6 point (2) of the Forest Code

(1996), stipulates that private forest ownership are admitted in the case of afforestation of private agricultural lands. Though in the same time, Strategy for SFM (2001) provides for transferring of all new forests in the administration of state forest authorities. It would be the act of extravagance to plant private lands that in the future would be transferred to state authorities. In addition to this duplicitous position, according to the Article 62 Land Code (1991) private forests can be planted on lands with low productivity. Hence, if somebody wants to afforest his private agricultural lands, he must write petition to the district council that provokes long and wearisome procedure.

A period from the beginning of 90-ies is marked as “transition”. During 1991-1996 period the volume of illicit cutting constituted 1.27 ml cubic meters; damage constituted at least 70 ml \$. As the illegal logging became a mass phenomenon, the Government approved in 1994 a Law “With regard to emergency state of forest and hunting funds in Moldova”. Because state had been dropping the reins over forests, government adopted on the proposal of the state forest authority, Decision No. 595 from 29 October 1996, “With regard to improve financial administration of the forests and protection of green areas”, which stipulates transferring of all forests into the administration of the state forestry authority. This task was one of the sorest subjects during last decade for forest, environmental, and local administrative state authorities. Hence, about 20320 ha of forests have been transferred to the state (Vdovii 1997), but in some cases these forests were logged illegally by all villages as sign of protest against mentioned decision. The same task had the special government decision of Moldova in 1960 year (Kravciuc 1966).

In our opinion so kind of legislation becomes more as part of nonfeasible policy, which according to Caughley and Sinclair (1994), “although it may give each interest group at least something of what they desire, sometimes the logical consequence is that two or more technical objectives are mutually incompatible”. As a result state owns degraded forests, rural people own eroded soils, and villages own poor pastures. This is one reason for us to be focused on the

perspectives of private small-scale forestry. Another reason is that 1864492 ha (55.1%) from all country are private lands that have a high potential and could be partly afforested, including agroforestry. Large spreading of pasturing and illegal logging in most of state forests point out that rural people are strongly interested in forests. Hence, it is option of local people to manage their lands as forest, agricultural land or in combination. Otherwise rural people migrated to the cities and other countries caused by the low salary led to the complete decline of many rural settlements and the appearance of under populated areas. In addition, the brain drain of young and qualified persons slows down the resolution of both, social and economical problems.

Hence the efficiency of small-scale family forestry is reflected in the efficiency of forestland consumption of non-timber purposes for transaction costs savings. In Moldova co-existing between small-scale forestry, agriculture and livestock farming become a cornerstone of sustainable rural development. Given its many advantages, small-scale forestry has a unique role to play in providing a variety of products including non-timber forest products. Consequently small-scale forestry has emerged in Moldova amidst significant demands of forest sector and overall economic structure at large. The three principle forms of ownership and control could be: private ownership either with or without public subsidy, private ownership with public regulation, and public ownership.

### **2.3. Potential specific features and diversification of small-scale forestry in Moldova**

Concerning to The Dictionary of Forestry (Helms 1998), “agroforestry” is defined as a land-use system involving trees and other woody perennials “in crop and animal production systems to take advantage of economies or ecological interactions among the components”; nonindustrial private forestry (NIPF) is defined as “forest land that is privately owned by individuals or corporations other than forest industry and where management may include objectives other than timber production”; a definition of “community forest” is

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From the Harrison, Herbohn, and Niskanen (2002) we present specific features and diversification of small-scale forestry systems in different countries. The term usually adopted for small-scale forests in the USA is non-industrial private forests (NIPF). These are usually thought of as forestlands owned by farmers, other individuals and corporations that do not operate wood-processing plants (Zhai and Harrison 2000). Sekot (2001) presented a definition of “small-scale farm forestry” in Austria as “a private forest holding of between 1 and 200 hectares where the proprietor is

a normal (and not juristic) person”. In Finland, Sweden and Norway “family forestry” has a long tradition with typical size of private forest holdings from 25 to 40 ha. In Germany, like elsewhere in German speaking areas in Europe (Germany, Austria, Switzerland), the size of private forest holdings varies considerably. On the one hand, there exists a number of forest holdings of less than 5 ha (36% of forest land), while on the other hand, 29% of forest land belong to farms of more than 1000 ha (Nain 1998). In Central and Eastern Europe (CEE), it is expected that, after the privatisation process, on average approximately 35-40% of forest land will be privately owned. Most of the holdings will be of only 2-3 ha in size. Japan has a long history of family owned forests, some dating back more than 300 years. Some unique and very high value products are produced, e.g. feature poles used in living areas. According to Ota (2001), nearly 90% of forest holdings are less than 2 ha, and the national average for the area of forest owned in 2.7 ha. In Australia, the term ‘farm forestry’ is widely used, and woodlots are common on commercial and lifestyle farms in the higher rainfall coastal areas. Over recent years, the rate of increase in private plantings has greatly exceeded that of government plantations (Herbohn 2001). The term ‘agroforestry’ is sometimes used to describe these plantings. The logic behind this use of the term is that forestry is integrated into the farm business, generating revenue and environmental services which complement other enterprises on the farm. The term ‘farm forestry’ is also widely used in New Zealand. In India, planted trees have been divided into eight classes: farm forestry; village woodlots; block plantations, road, pond, rail and canal side plantations; and others (collectively social and farm forestry). Block plantations are defined as compact plantings of more than 0.1 ha on private or government land, while farm forestry includes patches of up to 0.1 ha on private land. Some of these plantings are what can be called very small-scale forestry, i.e. a few trees along a fence line or canal. Following extensive deforestation in the Philippines, and concern over environmental impacts, the Forest Management Bureau of the Department of Environment and Natural Resources has actively promoted reforestation. The initial emphasis was on industrial forestry, but in recent years the focus

has switched to farm and community forestry. Mangaoang (2002) has suggested that a more appropriate term is 'smallholder forestry', which can include farm forestry, agroforestry and community forestry as practiced by families who have ownership or control over small parcels of barangay land and sometimes a share in the use of common property land.

In China, the term 'small-scale forestry' creates confusion for forestry specialists; tree planting has been taking place on a large scale, with increasing involvement of the private sector, and the term 'forest farms' appears to be more accepted (Shenqi and Harrison 2000). In Southern Africa, most countries are characterized by rural production systems and cultures, where small-scale agriculture provides a major livelihood. Forests are more generally publicly owned, or under community management. In Zimbabwe, for example, the state owns 12% of the total land area whereas communities own more than 40% on the basis of former Tribal Trust agreements (Tyynelä and Niskanen 2000).

In this context with a goal to apply some forest management modes and practices from other countries to Moldova we would suggest a combination between patches of up to 0.1 ha on private land in India, switched focus to farm and community forestry in Philippines and increasing involvement of the private sector in China. Of course the direction should be hold to Japan, Finland, Sweden and Norway modes including proportion between private and public forests. Consequently small-scale forestry in Moldova in perspective will be characterized by extensive local involvement in close to home forest management, and local control of forest stewardship. Small-scale forest practices will have great potential to produce a wide range of forest products, create sustainable livelihoods, contribute to a stable and diversified local economy, and generate environmentally friendly landscape values. Organizationally, small-scale forestry will be decentralized and without hierarchical structure.

### 3. DISCUSSION

Afforestation measures in Moldova during last 30 years have had insignificant results during both

periods of planned and market economies. As agricultural country, Moldova has a lack of strategic natural resources despite of soil and forest. As forest was almost destroyed until end of 19th century and soil remained one of the richest in the world, states during last two centuries put accent on agriculture and livestock farming as base of national economy. With the goal to increase efficiency of national economy, agronomists, zootechnicians and foresters applied different chemicals both in agricultural lands and over forests. According to Gania (1968) in the post-war period, application of dust DDT (15-20 kg/ha) was realised almost over all forest area of Moldova (210 thousands ha). Working of 20000 ha of slopes during 1960-1970 years that caused soil erosion and gliding, together with draining of 80000 ha of marshes led that land utilisation in the end of 80th increased until 90% of whole country (Capcelea, 1996). Consequently despite that forest cover have increased during that period on base of barren lands, the quality of forest decreased significantly. Diminishing of forest quality was caused also by coppice systems and afforestation with black locust species. Meanwhile, agriculture harvest has decreased gradually too, despite of enormous financial inputs.

Consequently during last ten years when almost all agronomists, zootechnicians and foresters grasped that combination between agriculture, livestock farming and forestry is almost ultimatum for the welfare of the country, exactly contrary becomes highly difficult to realise this goal. From ecological point of view most of lands degraded gradually, from social point of view gap between society and authorities becomes larger, and from economical point of view finances have become more difficult to find. In this instance accent should be focused on local natural resources. In other words there is need to encourage creation of new private forests and to create demand in all spectrum of forestry products (wood, pulp, bioenergy, mushrooms, game, medicinal herbs, berries, recreation). As people lost the trust in private forests there is need to elaborate the incentives key factors for restoration of private forests in Moldova. Gootee (2004) concluded that new incentives are also needed to enable private forest owners to more realistically consider options of reforestation and sustainable forestry. Government

must make rural people understand the advantage to change livestock farming by small-scale forestry or agroforestry. In our point of view, the cornerstone of the problems in relations of rural people with forest around in Moldova are feeling and educating of something private over land, keeping during a long history. In this context we suggest that actual afforestation company in Moldova based on public barren and degraded lands (supported by project "Soil conservation in Moldova" and Grant "Development of community forests" Galupa et al. 2004), will be much more longer than estimated deadline, because there is missed direct interest and quick benefits for the rural people. Moreover these supposed that forests would be affected continuously by illegal grazing and logging. When surveying the problems that are met by forest owners in Lithuania, a high level of bureaucracy was indicated as the greatest problem. Forest owners have also complained about illegal cuttings and lack of specialised information (Pivoriūnas 2004).

Comparing, in China according to Li and Zhao (2004) community forestry implemented first at the end of the 1980s is characterized by involvement of farmers, who, working as individual households, have become the main forces to manage their forestry related activities in light of specific conditions and their knowledge and skills in agriculture and forestry. Although the plots for planting are sporadic and small in size, they are helpful for farmers to solve the problem related to the contradictions between crop growing and economic development, and between population pressure and limited croplands. Specifically, they grow economic trees and cash crop trees, which bring quick benefits around their houses; timber trees are planted in private mountain lands. This approach would allow households to have incomes in both the short term and long term. It is small scale and relatively dispersed, which suits not only the real situations in the rural areas of China and characteristics of agroforestry and vegetation production, but also the countryside where systematic, organisational and human resources are lacking.

Moldova is relatively far from China and climate with geomorphologic conditions are also different. While the population density, forest

percentage and rural poverty are almost the same. With the goal to support our opinion about importance of private small-scale forestry for Moldova we underline the conclusion of Li and Zhao (2004). Hence in the past, government at various levels put great amount of labour, materials and funds into forest resources protection, control of soil erosion and environmental deterioration, but these measures did not produce desired results. The situation has been changed greatly in those regions where community forestry was launched, which is a miracle to certain extent. Community forestry is called "doorstep forestry" in China, and it has two main management modes: home-garden forestry and family forest farms.

Community forestry is one of the most important components of Centre for Environment, Development and Poverty Alleviation (CEDPA) according to which farmers are empowered with the "seven rights": the right to knowledge; to speak out, to decide, to implement, to manage, to use and to own (Zhao and Xu 2004). In the context of analysis of the Ford Foundation's Community-based Forestry Initiative, efforts which embraced the important connections between economic, social, and aesthetic values of natural resources were more likely to be successful (Luloff, Finley, and Flint 2004). Many studies even found that more small private forest ownerships lead to social-economic development (Sisock 1998 cited by Zhang, Y. and Zhang, D 2004).

Small-scale forestry is by no means an end in itself. The discrepancy between the desirability and viability of small-scale forestry must be addressed (Wang et al. 2004). Under Philippine Strategy for Sustainable Development in forestry the great challenge for the various stakeholders is addressing the following identified issues and concerns: (1) the People's Organisation (PO)'s lack of socio-economic base, (2) corruption, (3) lack of transparency and accountability of organizations involved, (4) the loss of interest of PO members to participate in project activities, (5) lack of technical assistance, (6) loss of credibility of Department of Environment and Natural Resources (DENR), and (7) the lack of equitable benefit sharing (Tarun-Acay 2004).

Family forest ownership in Europe is firmly rooted in local communities contributing to

economic and social sustainability of these communities. Family forest owners form a core part of social and cultural networks in rural and semi-urban areas. Their sustainable forest management is closely linked to their traditions and cultural identity that as such is highly diverse across the regions of Europe. Family forest owners in Europe have a strong attachment to their forests as their forests belong to the family since many generations and contribute to the family's livelihood. They pursue a variety of ownership goals deriving from strong stewardship values and multiple use forest management. The investments of family forest owners are based on a long-term perspective to the benefits of the generations to follow (Hufnagl, N. 2004).

In Policy of Lithuanian Forestry and its Implementation Strategy the objectives are for development of private forest owners training, consulting and education systems; introduction of a compensation system due to the restrictions of forest utilization in new established protected areas; integration of private forestry development into the general rural development programs supported by the EU (Mizaras, and Mizaraite 2004). In order to attain superior results both owners and entrepreneurs should get more organized, connected, and united in vocational and local associations. This issue should be resolved not only on the local level, but moreover on the state level by means of adequate policy in the domain of inheritance distribution (of forestland), taxation, environment, agriculture and forestry (Medved 2004). Small-scale forestry brings with it certain challenges, which include: (i) the need to balance private property rights and public values, (ii) ecological issues associated with the fragmentation of forest estates and landscapes, (iii) disadvantages arising from the small scale of operations, (iv) high costs of transporting products over long distances from communities on forest edges to the marketplace, and (v) inadequate social, economic and political influence of small-scale forestry groups (Wang et al. 2004).

## CONCLUSION

Opportunity of small-scale forestry is demonstrated by recent community forestry

(home-garden forestry and family forest farms) implementation in China and since many generations family forest ownership in Europe. In the same time implementation of Community-Based Forest Management in Philippine identified issues and concerns: (1) the People's Organisation (PO)'s lack of socio-economic base, (2) corruption, (3) lack of transparency and accountability of organizations involved, (4) the loss of interest of PO members to participate in project activities, (5) lack of technical assistance, (6) loss of credibility of Department of Environment and Natural Resources, and (7) the lack of equitable benefit sharing. In this context with a goal to apply some models and practices from other countries to Moldova we would suggest a combination between patches of up to 0.1 ha on private land in India, switched focus to farm and community forestry in Philippines and with increasing involvement of the private sector in China. Of course the direction should be hold to Japan, Finland, Sweden and Norway models of proportion between private and public forests.

The actual impediments for the promotion of small-scale forestry in Moldova are conflict between extension of forest area and maintaining of pastures for rural people, conflict between afforestation and land privatization (as almost finished measure), unbalanced proportion between priorities for the different national branches, private and state forests, salary and investments in forestry and other economic branches, allocated time for different disciplines at forest speciality etc. In order to improve the opportunity of small-scale forestry main objectives and actions are proposed:

- to balance forestry with agriculture and livestock farming. This objective could be achieved by afforestation of private agricultural lands, agro-forestry, total prohibition of grazing in the forests; increasing the demand for wood and thus increase the value of the forests. That should be supported by big education campaign for forest owners and workers in order to improve knowledge and increase interest in forest conservation;
- to promote and practice as large as possible multifunctional and deep forestry (furniture, pulp, timber, firewood, bio-energy, hunting, mushrooms, tourism, etc);

- to encourage creation of new private forests and to create demand in all spectrum of forestry products (wood, pulp, bioenergy, mushrooms, game, medicinal herbs, berries, recreation);
- to elaborate the incentives key factors for restoration of private forests;
- in relations of rural people with forest around in Moldova, feeling and educating of something private over land, keeping during a long history;
- significant correlates of forest income among this population;
- rural people (peasants and intelligence) should be empowered with the “seven rights”: the right to knowledge; to speak out, to decide, to implement, to manage, to use and to own;
- the investments of family forest owners on a long-term perspective to the benefits of the generations to follow;
- introduction of a compensation system due to the restrictions of forest utilization in new established protected areas;
- integration of private forestry development into the general rural development programs supported by the EU;
- the need to balance private property rights and public values;
- ecological issues associated with the fragmentation of forest estates and landscapes;
- disadvantages arising from the small scale of operations;
- inadequate social, economic and political influence of small-scale forestry groups;
- government must make rural people understand the advantage to change livestock farming by small-scale forestry or agroforestry.

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