УДК 674:330
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IMPLEMENTING SUSTAINABLE FOREST MANAGEMENT FROM POLICY TO LANDSCAPE AND BACK AGAIN

To implement sustainable forest management (SFM) in actual landscapes, policy actors and managers exercising governance and different users need to be provided with empirical information of how different SFM dimensions are perceived and develop locally. This paper outlines the need of transdisciplinary research and development using multiple case studies to understand the role of forested landscapes in regional development. To provide proof of concept for our approach we review the state and trends of SFM implementation in Ukraine, which represents one of the post-Soviet countries in transition from socialist planned to market economy. First we review the national policies relevant for forest and woodland landscapes, and describe how the involved institutions implement policies top-down. Using the Skole district in the Carpathian Mountains as a case study we then describe the status of SFM, and evaluate the implementation process bottom-up. The Ukrainian government is the primary forest actor and implements policies through national, regional and local institutions as well as state forest enterprises. This multilevel system of policy implementation implies a command and control «top-down» approach to forest management. Hence, there is also a long way for any initiatives from actual management units back to the policy-making level, and thus in principle an absence of an efficient working mechanism for forest users to influence the forest policy. Interviews and analyses of official statistics show that: (1) Forest enterprises focus exclusively on the economic dimensions of SFM. (2) Local level forest managers do not understanding the full width of the SFM concept and the reasons to follow its principles. (3) Even if only 3.6% of the Skole population is employed by forest enterprises, forests play a vital socio-cultural role and provides livelihood for much more people. (4) The ecological functions of forests are being degraded and restoration is needed in many cases. Collaboration between foresters and scientists is not as effective as it should be. (5) The public opinion about foresters and forest management is negative. There is no mechanism for local users to influence forest practice in the area. Three types of gaps need to be bridged: (1) A policy implementation gap between the official definition of SFM, and how its different criteria and objectives are understood by forest actors. (2) A policy creation gap between the local level situation and ecological, economic and socio-cultural needs at the national and regional levels. (3) A knowledge gap between the need of a holistic transdisciplinary approach for SFM implementation and the present sectoral and disciplinary situation. Ways of bridging these gaps are capacity building, introducing arenas for co-management, and applying a zoning approach at multiple scales to satisfy economic, ecological and socio-cultural dimension of SFM.

Keywords: sustainable forest management, forested and woodland landscape, governance, forest policy, integrated management, multiple case studies**.**

Introduction. Sustainable forest management is a concept in transition from a fo-cus on sustained yield of wood to multiple products and services. Since the early 1990s the international forest policy discourse recommends that economic, ecological and so-cial values should be taken into account. In Europe this is clearly reflected in the Pan-European forest policy process, which has defined a suite of criteria and indicators to define these values in more detail at the European level. Similar developments have occurred at the national level. To implement sustainable forest management, Boyle et al. (2001) suggested a triad of activities including (1) developing governance as a process of providing a vision and direction for sustainability, (2) management as the operation-alisation of the vision, and (3) monitoring of indicators representing agreed values to provide feedback by synthesising observations to narratives of how the situation has emerged and unfolds. The

tools required for each step are manifold, and need to be adapted to local and regional conditions.

While there is consensus at the international policy level about applying the idea of three pillars of sustainability – ecological, economic and socio-cultural – to forest management, the focus on different sets of values shows large variation in the current focus and trajectories of development among countries and regions stressed the need to acknowledge the range of conditions in different countries and regions when providing policy recommendations. The EU forest action plan, which is presently under development, underlines the need to address sustainability of forest management at multiple spatial scales from stands and landscapes to ecoregions and countries.

As wood resources become an increasingly globalised commodity there is a need both to understand the local and regional footprint of international demands, and what suite of tools for policy-making and management would be appropriate under different biophysical, economic and socio-cultural conditions, and systems for governance. Understanding the effects of the international forest policy discourse and the globalization of the forest sector on the one hand, and traditional local, regional and national factors on the other, requires research based on multiple case studies. Studying forest manage-ment units located along Europe's long gradient between the West and East using a combination of top-down and bottom-up approaches would alleviate the understanding about how SFM is perceived and is developing. In this way the combination of different sets of tools for implementation could be better adapted to the region of interest.

The transition from socialist planned to market economy in post-Soviet countries is of paramount interest for forest sector development in Europe [1]. These complex economic and political changes provide an excellent «pseudo-experimental» opportunity for multiple case studies using countries, regions and local landscapes as replicates. Following the break-up of the Soviet Union Ukraine reappeared as an independent new state in 1991. Ukraine, located in the geographical centre of Europe with both zonal and azonal forest ecoregions, represents a globally relevant range of gaps to be bridged to develop the sustainable forest management discourse in actual landscapes. During the socialist period intensive development of the Ukrainian industry had a negative impact on the environment in several important forest regions due to air and soil pollution, unsustainable use groundwater supply etc. [2]. Clearing of forests for agricultural development during the historic time and more intensive forest management led to forest fragmentation, a large share of planted (45.6%) forests. For example, in the Carpathian region of Ukraine monocultures of coniferous even-aged stands were created which are characterized by low ecological stability. As a consequences the area of forests damaged by insects, fires, and windfalls has increased during the last years.

Due to the Chernobyl accident in 1986 a large part of Polesia's forests in north Ukraine became contaminated with radioactivity. Around 3.5 million ha (37 %) of forest area were affected, of which 157,000 ha (1.6%) now has no potential for use due to radioactive contamination [2]. Additionally, people in many regions in Ukraine experience decreased standards of living due to the disintegration of the planned economy. Legal and illegal extraction of wood and non-wood forest products has become a vital source of income for many people. Additionally forests and woodlands provide subsistence for livelihood of a large village population, which lives in close proximity of forest. To promote sustainability on national as well as regional and local levels Ukraine has joined the process of developing forest management ideas and principles oriented towards sustainable yield forestry, maintenance of forest biodiversity and socio-cultural values [11-

17]. The strategic objectives of the national forest policy are related to those enumerated in international agreements of sustainable development, sustainable use and protection of European forests. Ukraine has also signed the 17 resolutions of the Ministerial Conferences on Protection of Forests in Europe. As a country in transition it is very important to evaluate the heritage in forestry from the previous political systems for understanding what should be changed or remain under the new political and economic conditions. The debate concerning the «socialist heritage» in Ukrainian forest management shows that it should be critically analyzed for the future development of forestry. For example, according to Polyakov and Sydor (in press), the Ukrainian forestry during the Soviet time (especially in the second half of 20 century) «could be judged as a sustainable». They concluded that «Ukrainian forest management under a socialist centrally planned economy did a good job in providing environmental benefits from the forests to the citizens, as well as in preserving and multiplying forest resources». Some features of Ukrainian forestry like «long-standing sound plantation policies and sound methods» which were implemented under socialism rule, «constitute positive heritage and need to be maintained in order to succeed in the transition to a market economy». Nijnik and Van Kooten presented an opposite view. They argued that under the command-control economy «the forest resources were excessively exploited and that inadequate attention was paid to silvicultural investments, despite official rhetoric to the contrary».

However, in none of these studies neither was the large regional variation in Ukraine considered [3], nor was data describing local level indicators for different dimensions of sustainable forest management presented for different regions. To resolve this debate we argue that empirical research be made at multiple levels tracking the policy cycle from policy-making to actual forest landscapes and back again. This approach should then be applied in a suite of regions representing different phases in the development of sustainable forest management.

The aim of this study is to outline a multilevel case study approach representing a simplified policy cycle from the formulation of policy, to management and feed-back based on how the situation in a forest management unit, consisting of a local landscape, unfolds over time using quantitative and qualitative data. We then apply this approach to evaluate the implementation process of policies related to the sustainability of rural landscapes dominated by forest and woodland by using one landscape scale management unit in Ukraine's Carpathian Mountain region as a case study.

To understand how sustainable forest management is defined, implemented and perceived in Ukraine as a whole, we first review the national policies relevant for the development of rural forest and woodland landscapes. We then describe the institutions and policy instruments translating policies «top-down» to the management unit we chose as case study. The resulting state of different local level dimension of SFM is summarised. Finally, we evaluate the implementation process «bottom-up» by studies of how policy messages are fed back to the policy level again.

Methods. Working with a complex concept such as sustainable forest management at the forest management unit (or landscape) level requires special emphasis on finding platforms for integration among ecological, economic, socio-cultural values. This applies both to the relevant disciplines and actors and to the desired integration from policy to practice, and back again; Angelstam et al., submitted). The landscape concept is a mean of achieving this because it can be used both in the sense of territory and sense of place. The latter emphasises the interconnectedness of the natural, the social and the cultural, as well as of temporal and spatial processes, in the evolution of a particular landscape. The landscape

concept also reflects the need to expand the spatial scale of management, i.e. to move from smaller spatial units or objects to the scale of landscapes and regions, i.e. include micro, meso and macro levels. Additionally, the corresponding social organisational scales must be considered. A landscape forms a whole entity, where natural and cultural components are intermingled, and cannot be viewed as separate entities or processes. This means that perceptions of landscapes and of processes that form and reshape landscapes must be taken into account. Perceptions are subjective and based on values, and are an intricate part of our decisions concerning policy formulation and management. Thus, a landscape includes both tangible and non-tangible variables. We understand a landscape as a social-ecological system that includes abiotic, biotic, social, cultural and administrative components. For analysis of the policy implementation (top-down) and policy evaluation (bottom-up) processes in a local landscape multiple qualitative and quantitative methods were employed (fig. 1, table 1).

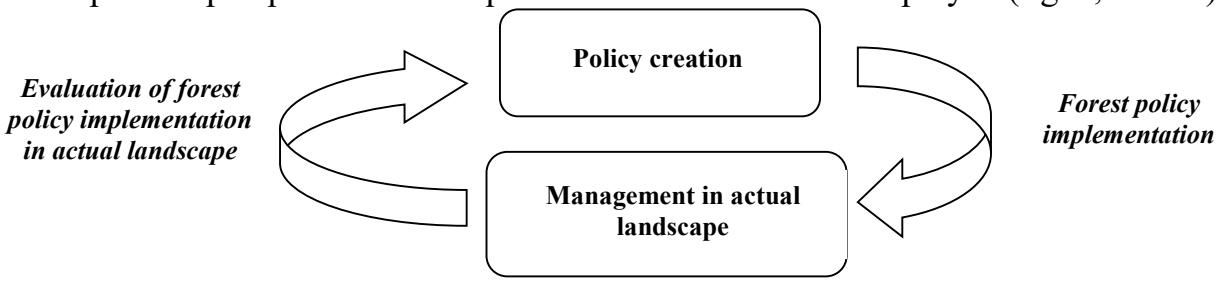

Fig. 1. Simplified policy cycle

We analysed national forest legislation to understand the compliance with the SFM discourse. To understand the official institutional arrangement expert interviews were made with directors of all five state forest enterprises in the Skole district and with the director of the national nature park «Skolivsky Beskydy».

Table 1. Summary of methods used to study different dimensions of the simplified policy cycle presented in fig. 1

	Documents	Data	Interviews
Forest policy creation	National policy documents, legislation		
Forest policy implementation			Forest management directors and local stakeholders
Management in actual forest landscape	Historic documents	Statistics Cartographic data	
Evaluation of forest policy implementation in actual landscape			Forest management directors and local stakeholders

The standard interview manual contained several groups of questions including personal data of the respondents, data about forest composition and structure, ownership patterns, company's attitudes to forest management and conservation, biodiversity status, changes in forestry, and logistics of forest practise. Additionally, interviews with representatives of three local communities were made to understand how policy

implementation is perceived locally. Finally, analyses of published statistical data and recent original documents from the state forest enterprises were used to quantify the state and trend of ecological, economic and socio-cultural dimensions of SFM.

This study is the first in a planned series of empirical landscape scale case studies focusing on SFM development in the transition from socialist planned to market economy in the former Soviet Union. We therefore find it important to present a detailed description of our case study area. This allows for making future meta-analysis based on comparisons among case studies with different biophysical, economic and socio-cultural conditions, as well systems of governance. Only in this way it will be possible to understand real needs and conditions of SFM implementation in different regions, and to create national, regional and local programs of SFM implementation, which would be based on empirical data and information.

Ukraine. Next to Russia, Ukraine is the largest European country covering 603,548 sq. km. The forested area in Ukraine is 9.4 million ha, or 15.6 % of the total land area. By contrast, according to historic data, the natural potential forest and woodland cover in Ukraine has been estimated to be 43 %. Forests range from mixed hemiboreal and broadleaf forests in the north, to steppe-forest woodland and steppe in the south. The forests in the Carpathian Mountains range from temperate and mixed forests to forests with a boreal character close to the tree line. Crimea's mountains range from Mediterranean shrub to broad-leaved and coniferous forests.

As a result of climatic conditions and anthropogenic influence during the historic time forests are very unevenly distributed in Ukraine [2]**.** The forest cover in different re-gions varies from 3.8 % in the steppe zone to 40.2% in the Carpathian Mountains. The majority of forests are concentrated in the northern and the western parts of Ukraine. Conifers occupy 42.6 % of the forested area, with pine trees accounting for 36 % of this figure. Deciduous forests cover 57.4 % of the total area, with beech *Fagus sylvatica* and oak *Quercus robur* comprising 33 % of this figure. More than half of Ukraine's forests (55.8 %) are classified as 'first group forests' – comprising multipurpose protective for-ests, «sanitary-hygienic forests» that mitigate for example air pollution, and forest re-serves. This group of forests mainly fulfils protective functions. Thus, forest management is restricted, for certain categories of forests final fellings are not allowed or rotation ages are much longer than in commercial forests. Other forests, mainly used for wood produc-tion, are classified as 'second group forests'. The area of the first group of forest has been increasing since 1991 due to creation of new protected areas. In land owned by state for-est enterprises the share of first-group forests increased from 34% to 50% since 1961. The Ukrainian forests are characterized by high productivity. The annual total average incre-ment is 4.0 m^3/ha, which is about 10% higher than the average level in the EU countries. The annual total increment varies from 5.0 m^3/ha in the Carpathian Mountains to 2.5 m^3/ha in the steppe zone. The total growing stock on forested areas is 1.74 billion m^3. The average wood stock is 185 m^3/ha. Massive felling during World War II and subsequent intensive forest planting has led to a prevalence of middle-aged plantations. Forests aged up to 20 years comprise 31% of the total forest area, from 20–40 years – 45%, from 40–60 years – 13 % and older than 60 years – 11 %. The average age of a Ukrainian forest is 51 years. Today, forest plantations account for about 45,6 % of the entire forest area. Cur-rently, about 13 million m^3 of timber is harvested in Ukraine per year. Each year, enterprises of the State Forestry Committee of Ukraine cut and sell more than 7.6 million m^3 of wood, including about 5 million m^3 of industrial wood.

Skole district. Our local level case study is the 147,100 ha Skole district, which is situated on the north-eastern side of Eastern Carpathian Mountains in the upper part of the

Dnister river basin and its tributaries Stryi and Opir. We use the Skole district as a «landscape laboratory» for understanding how sustainable forest management is being implemented to satisfy ecological, economic and social dimensions taking into account cultural heritage of the region and landscape legacies. Three mountain forest ecoregions can be defined in the Skole district: the upper Dnister Beskydy, the Skolyvsky Beskydy and the Stryi-San highland. *The upper Dnister Beskydy ecoregion* consists of longitudinal ridges with an altitude of up to 700-800 m, which are separated by wide river valleys. The climate is moderately continental with a temperature sum of 1800-2200 ºC, and an annual precipitation of up to 1000 mm. The natural forest trees are beech and beech-fir (*Abies alba*). However, the once natural tree species composition and spatial distribution of forests have been altered considerably in the past. Presently, the forest cover is around 30 %. The remaining land is used for agricultural purposes and settlements.

The Skolyvsky Beskydy ecoregion is characterized by domination of moderately high ridges (800–1400 m). The highest top in the district is Parashka (1268 m). The average altitude is 805 m. The ecoregion has a characteristic vertical vegetation zonation. Up to an altitude of 600-700 m fir-beech forests form the natural tree vegetation, then spruce (*Picea abies*) and beech, and spruce-fir-beech forests dominate to 1000-1100 m. Finally, from 1000 m and higher up boreal Norway spruce forests are found. Willows (*Salix spp*.) and alder (*Alnus incana*) grow in river valleys. However, this natural zonation of vegetation has been dramatically altered during the course of history. Beech forests were covering nearly 60% of the area before modern economic development commenced. Today, however, most of these forests have been cut down, and transformed into meadows and tilled agricultural fields. In the mid-19th century, the Austro-Hungarian regime introduced the concept of modern sustained yield forest management with extensive planting of monocultures of Norway spruce of Austrian provenance. Spruce forests thus dominate nowadays, and they are sensitive to fungal infestations including root rot, and insect outbreaks. In recent decades alder and birch form different successional stages on abandoned agricultural land. The main characteristics of the *Stryi-San highland ecoregion* area are low mountain ridges with level slopes and narrow ridges. The absolute altitudes are from 750 to 850 m, occasionally reaching 950-1238 m, and the relative altitudes do not exceed 200-400 m. The climate is continental with abundant precipitation up to 900-1000 mm and the mean annual temperature is 5.6 – 6 ˚C. Spruce forests grow on steep ridges, and remnants of beech forests occur on the southern slopes. The valleys of rivers and mountain meadows are used for agriculture and settlements.

Results. The national policy level and institutional framework. Ukraine is in an economic and political transition period, and has joined the process to develop forest management ideas and principles along the lines of global sustainability discourse oriented towards the sustainable forest management. Ukraine has supported and signed many resolutions of the Ministerial conferences on sustainable forest management. Additionally, bilateral agreements about cooperation in sustainable forestry with neighbouring countries (Austria, Poland, Russia, Slovakia) have been signed.

Today the principles of SFM are adopted into the national legislation and forest programs. The main trend of the official forest policy is thus to provide a balance be-tween the conservation of forest ecosystems and the continuous, multi-purpose use of forests. In Ukraine legislative frameworks of forests and forest resource management are formulated in the Forest Code of Ukraine (1994), Law on the Environmental Protec-tion of Ukraine (1991), and other legislative documents and governmental regulations that play a fundamental role in developing environmentally sound forest operations. The Forest Code

stipulates that forests have primarily soil protective, water-conservation, air-cleaning and health-giving functions, while their economic use is considered as having limited importance. In general the structure and context of the forest legislation in Ukraine is similar or the same as the forest legislation of the Soviet time [4].

According to the political and legislative documents the main goals of forestry in Ukraine are to (1) conserve biological diversity in forests; (2) extend forest covered territory to an optimal level in all natural zones; (3) protect forest function and to limit forest exploitation; (4) improve social protection of forestry workers; (5) increasing the resistance of forest ecosystems to negative environmental conditions; (6) improve forest management legislation according to international principles of SFM; (7) encourage the development of forest research and education. According to the Forest Code (1994) forests may be leased out temporarily or permanently for different kind of utilization. Permanent forest utilization is only allowed by forestry enterprises. Parts of the State Forest Fund may be leased out for periods of 3 to 25 years to enterprises, organizations and private citizens both of Ukraine and other countries. A total of 65% of the forested areas are under permanent holding of state forestry bodies, 26% are managed by Ministry of Agriculture, and 9% are managed by Ministry of Defence, Ministry of Transport, Ministry of ecology and natural resources and other organizations.

There is a division of the forests resources into resources of state importance (wood from final harvest and resin collection) and resources of local importance (all other products). All citizens have the right to walk in the forests, pick berries and mushrooms. Any other utilization is connected with a fee.

The forest policy creation and implementation process. There are three main levels of forestry policy implementation in Ukraine – national, regional and local (fig. 2). The Supreme Council is the central legislative body. The state body especially re-sponsible for forestry in Ukraine is the State Committee of Forestry and its departments on regional and local levels. Driven by the transition towards market economy from 1991, the governance system in Ukrainian forestry has been restructured. Compared with the Soviet time forestry and the wood products industry were split into two distinct bodies in 1996 when the State Committee of Forestry replaced the Ministry of Forestry. The wood-processing sector was to a large extent privatized [4]. The State Committee of Forestry ensures regeneration and improvement of the forest stock, to provide protection and conservation of forest as well as providing an organization for forest resources and their use. The Ministry of ecology and natural resources of Ukraine is the main state body to control the use of forests and their protection. The Supreme Council, the State Committee of Forestry and the Ministry of ecology and natural resources are the main policy makers and the dominant actors in the Ukrainian forest sector.

Each main actor at the national level has own representatives at the regional and local levels. For example, the State Forestry Committee of Ukraine is represented by 25 regional forest management units. They oversee 244 local state forest enterprises, 48 state hunting and 20 forest hunting enterprises, five natural reserves, and 15 wood industry, road-building, special forest protection, forest inventory and other enterprises.

The practical implementation of the forest policy is carried out by state forest enterprises. Their functions include forest regeneration and management of the wood supply. The range of activities of the state forest enterprises differs among regions. The extent of these activities depends on the local availability of resources and production capacities. Finally, the local governments have responsibilities to allocate forests for permanent or temporary use.

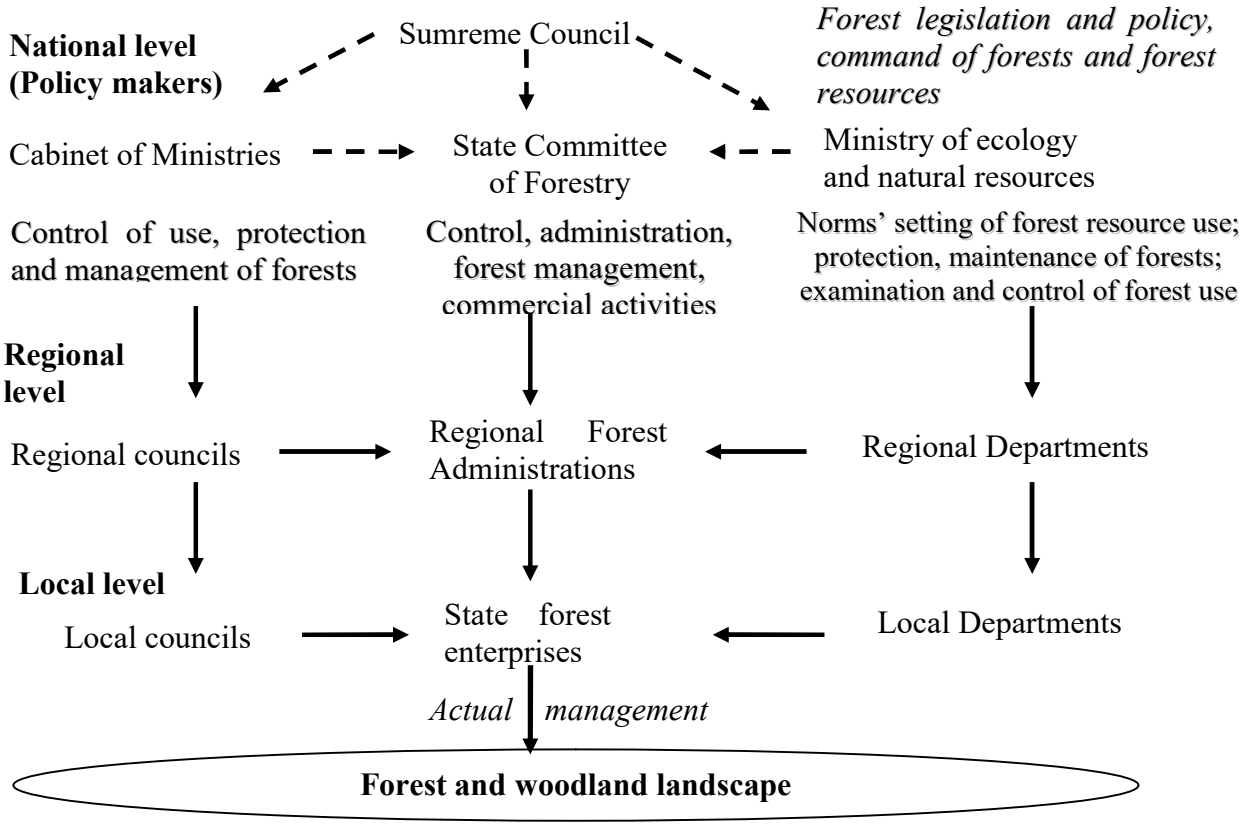

Fig. 2. The hierarchical (top-down) system of governance in forestry with main responsible bodies for forest policy creation (shown by dotted arrows) and implementation in Ukraine (shown by solid arrows)

Skole district– ecological, economic and socio-cultural dimensions. Legacies of the historical development. The dynamic history of the Carpathian Mountain region with a range of different management paradigms has influenced the forest landscape in many dimensions. Understanding these legacies of the past is an important starting point for the implementation of sustainable forest management in this diverse region. Consid-erable deforestation of the Eastern Carpathians took place about seven thousand years ago when the mountains came under the influence of primitive agricultural activity. In pre-agricultural period, the Skole area was populated predominantly by Slavic tribes, which were engaged in hunting, fishing and gathering since the mid-Neolithic period. In the second half of the fifteenth century, Boikos, a tribe or ethnographic group of Ukrainian highlanders who inhabit both slopes of the middle Carpathians, began to set-tle in the Skole area. They introduced new traditions the introduction of slash and burn farming. The use of fire led to a considerable decrease in coniferous species, such as Norway spruce and fir, and species with big and heavy seeds like oak and beech. Local people maintained the traditional land use almost until the 18th century. The agricultural and forestry practices of that time were to a certain extent a prototype of an environmental-friendly and locally sustainable use of natural resources. The Boikos de-pended completely on the availability of local natural resources, and on the maintenance of an ecologically balanced environment with minimal use of imported resources, goods and energy [5]. Historically, Poland and the Austro-Hungarian Empire on the one hand, and Russia on the other, divided today's Ukraine geographically into an eastern and a western multi-ethnic sphere. Continuous

external political, economic and social influences have resulted in the decline of traditional forest and land use systems.

The character and intensity of the use of natural resources in Skole area began to change in the nineteenth century. As a result of high demand for wood in West Euro-pean countries, the forest industry began to develop. Forests were cut, and mostly ex-ported as timber, which was transported by means of river logging. Often only 30-35 % of the wood would arrive at its final destination. As a rule the wood harvested was not used efficiently. Many trees were left to rot in the forests. The areas cleared of forests were not reforested again. Only a small quantity of wood was processed at the same place where it was cut down. Starting in 1874 the wood export situation improved as railroads begun to be built across the Carpathian Mountains. Only a small quantity of wood was processed at the same place where it was cut down. Large areas of beech for-ests were burned in order to produce potash, which was also exported. The Carpathian Mountains had thus become a source for various kinds of wood and wood products at the international market place. The demand for spruce wood on the world market and the rapid decrease of the supply prompted the owners of the forests to replace the deciduous forests with spruce. In 1882 this tendency was legalized by the Austrian government, which passed a resolution to replace beech, fir and other forests with Norway spruce forests of Austrian geographic origin. Only at the end of the nineteenth century, the first attempts were made to reduce forest exploitation and to restore forests. In 1894, the Austrian government passed a law regulating the use of for-ests and instituting responsibility to care for young trees. A complete change of political, social and economic relations in the country that had a profound influence on the ways in which natural resources were used was initiated in 1939 when the Western regions of Ukraine became part of the Soviet Union. The Soviet regime (1939-1991) had an especially disastrous impact on the local people's way of life and use of land. Private land property was expropriated, people were forced to emigrate, arable lands increased at the expense of wooded grasslands, and forestry became more intensive.

The structure of land and forest properties was changed. Forests were now owned by state, private plots of land were joined into collective farms (kolkhozes/kolhosps). Collectivization and mechanization left no space for the traditional way of life. The use of natural resources in Skole area during this period was shifted towards industrial use of forests with spruce reforestation, which was caused by the growing importance of forestry in the Carpathians in general, and within the Skole district in particular. This was accompanied by an increase in both harvesting and reforestation.

***Ecological dimensions*.** Changes in forest environments caused by long or inten-sive management include loss of species (a compositional aspect); reduced amounts of dead wood, large trees, old and structurally diverse stands and intact areas (structural aspects); and altered processes (functional aspects). The forests of Skole district have more than 200–yr management history. As a result of this long and intensive forest exploitation several elements of forest biodiversity have been altered. Data from 2004 show that of the total district area (147,100 ha) forests occupy 71%, agricultural land 25%, urban areas 2%. According to Holubets and Odynak (1983), natural forests of the Beskyd area with increasing altitude were made up by beech, beech-fir, spruce-beech-fir, fir-spruce. Pure spruce forests at lower altitude were not found.

Intensive forest exploitation led to reduction of beech and beech-spruce-fir forests in Skole area. Oak forests in the valleys were reduced to a minimum already in seven-teen century. At present time, monocultural spruce plantations prevail. The dominant species are Norway spruce (59%), beech (30%), and fir (5%). Middle-aged and young stands cover

more than 70%, and premature and mature stand a total of 28% of forested area, most of which are in protected areas. According to unpublished forest enterprise data and interviews with state forest enterprise directors, between 30 and 60% of the forested area under their management suffers from pest diseases and root rot, which cause death to Norway spruce stands. To conclude, human forest activity has created ecologically unsustainable forests, the economic potential of which is not fully utilised.

First group forests, meaning that final felling is prohibited under the management of forest enterprises, cover 61,700 ha, or 61% of forested area. It includes forests within the bound of national nature park «Skolivsky Beskydy» and also forests along riverbanks, shelterbelts along railways and roads, green belts of settlements, and forests around sub-alpine meadows. Inappropriate logging and road building techniques continue to be one of the greatest obstacles to sustainable forest management (SFM) in the Skole district. Cutting streamside buffer zones, skidding across rivers and up riverbeds, point-source pollution, and the reliance on obsolete or inappropriate timber transport technology characterise the current logging practices. Decreased site productivity, soil compaction, sheet and gully erosion, mass movement, sedimentation, decrease in water quality and fish habitat are manifestations of these poor logging practices. Habitat loss and fragmentation is thus evident for both terrestrial and aquatic ecosystems. Nevertheless, specialised and area-demanding species representing natural forest landscapes occur in the study area. Of special interest are black stork (*Ciconia nigra*), booted eagle (*Hieraeetus pennatus*), lesser spotted eagle (*Aquila pomarina*), capercaille (*Tetrao urogallus*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), lynx (*Lynx lynx*), wild cat (*Felis silvestris*), badger (*Meles meles*), pine marten (*Martes martes*), otter (*Lutra lutra*), and European bison (*Bison bonasus*). There are also seven breeding species of owls and nine breeding species of woodpeckers [6]. This indicates the ecological status is not as deteriorated as in many West European countries [7].

An important factor contributing to improved ecological sustainability in the area was the creation of the national nature park «Skolivsky Beskydy» in 1999. The park's territory covers 24.3 % of the total area of Skole district, including 7.5% of the total district's area of strict and regulated nature protection management. The national park is a refuge for 29 animal species from the Ukrainian Red List, including 22 animal species from the red list of the Bern convention and five species from the European Red List [6]**.** Natural reforestation of abandoned agricultural land in the valley bottoms is a wide-spread present phenomenon in Skole district. Marginal lands of former collective farms, which are not used any more for grazing and crop production are been covered by for-ests due to natural succession dynamic. The effects of natural reforestation on biodiversity are diverse and complex including both loss of important habitat types in the cultural landscape and initiation of secondary succession of use for other species.

Economic dimensions. The number of inhabitants in the case study area is 48,900, including a rural population of 35,800 (73.2 %), and with 26,500 people in working age. Since 1989 the local population has decreased with 2,600 people. The average population density is 33 person/km² [6]. The number of employed people in the district is 17,600 (66 % from total people in work-able age and 49% from total population), including 6,043 employees of state enterprises (22.8% of the total people in work-able age or 12.4 % of the total population). The main individual employers in the Skole district are educational foundations (6.5 % employed people from total number in workable age), forestry sector (3.6 %) and health service (3.2 %).

The forest in the Skole district belongs to the state. The State Committee of Forestry of Ukraine controls 63.3% of the study area's forests. The former collective farm forests (26.3%) are under the jurisdiction of the Ministry of Agriculture.

The Ministry of Defence and other ministries manage the remaining forest area. There are five state forestry enterprises (lisgospes), one national natural park «Skolivsky Beskydy» (SBNNP) and five state hunting farms. The area of the SBNNP is approximately 35,684 ha and forest covers 87.8 % of Park terrain. The total area under the management of the leskhozes is 80,912 ha (or 80 % of forested area). The per capita non-state (private and commons) land distribution in the Skole district is 2.99 ha/person, of which 0.26 ha/person is arable land. According to the 2004 forest statistics, the total growing forest stock is 29.98 million m^3, including 20.41 million m^3 of conifers (68.1 % of total growing stock), 6.14 million m^3 of mature and over-mature stands (20.4 % of to-tal growing stock), including 3.90 million m^3 of conifers. The average stock per hectare of forest land is 298.3 m^3, in mature and over mature stands 431.3 m^3. The annual wood increment in the area is 4.0-5.3 m^3 per hectare. The area of forest available for final har-vesting (from the second group) amounts to around 33,000 ha with additional 35,410 ha (from the first group) where final harvesting is allowed. On average 1.5 m^3/ha of timber is harvested from the final fellings and 1.7 m^3/ha from intermediate fellings, which corresponds in average 30% of annual wood increment. According to the interviews with directors of the state forest enterprises in Skole district, the 190,134 m^3 of timber was harvested in 2003, including only 85,797 m^3 (45.1 %) from final harvest operations.

The volumes of harvested wood have been increasing since 1998 (141,334 m^3) mainly due to increasing of timber amount from intermediate harvest operations; from 57,008 m^3 in 1998 to 104,337 m^3 in 2003. The total area of clearcut in 2003 was 1,815 ha and forest regeneration was made on the area of 587 ha. A low level of investments in the forestry sector is the main reason for a low level of regeneration activities after harvesting during the last years. About 65-70 % of wood harvested in the district is ex-ported as round wood, thus adding only limited value to local community economic de-velopment. The total income generated by forestry sector was 23.8 million Hrivnia (or about 4 million euro) in 2003, which was 3 times higher that in 1998. According to in-terviews with directors of the state forest enterprises in the Skole district they pay stumpage fee as permanent forest users to the central budget. The Skole district is ac-tively used for recreational purposes. There are 12 resorts and tourist national level centres, 3 motels, and 75 small regional level recreational centres.

The recreational and tourism activities are connected with forests, and depend ul-timately on the stability of forest ecosystems and quality of forest resources. Forests used for recreational activities are mostly under the management of state forest enter-prises, which have to invest money for development recreational facilities. The risk for conflicts between forest logging operations and different recreational uses of forests is obvious. The national natural park «Skolivsky Beskydy» could be a main tourist desti-nation, but due to the lack of funds the park administration is unable to efficiently de-velop infrastructure for tourism. The ongoing economic transition has caused a decrease in monetary incomes caused by inflation and inefficient economy, unsatisfactory social protection, and high level of unemployment. The forest sector in Skole district plays therefore an important indirect role in the livelihood of local people. The economical crisis during the transition period has made local people's physical survival directly depend on the local use of natural resources. Some negative developments and trends in local land use practise have been noted. The first is an increased role of forests as a source of fuel-wood and non-wood products for

self-subsistence food production. The second is increasing the illegal exploitation of forest resources.

Socio-cultural dimensions. Suitable indicators of social and cultural dimensions are limited. Local people have to come back to their traditional land use practises, which play an important role in maintenance of biodiversity and rural development. Non-wood forest products (NWFP) such as mushrooms, berries, honey, medicinal herbs, floral greenery, birch sap, resin and wild game are part of the social fabric and livelihood of Ukrainian culture, especially in forest-dependent communities, like the Skole district. The conflict between forest industry and vital interests of local people is due to increase of harvested timber and the conflicting sustainable production of NWFP. The Skole district has a rich history. The restoration and protection of historic sites of regional and national value have been increasing since 1991, and the Skole district has been recognized as an integral part of Boyko's ethnographic area in the Carpathians. The support of traditional Boyko's land use, which is closely connected to forests, should be a milestone in a regional program of SFM. The privatization of arable and forested land (with restrictions) by local people that began after the collapse of the socialist system, has increased the social and cultural value of forests, which are becoming family's heritage for generations. This process has exceptionally significance for people in the Western part of Ukraine where old generation still has feeling of owners and memories about unjust political and social events, which brought them to ruin.

Evaluation of obstacles and gaps. A first set of obstacles is associated with pol-icy creation and related to the current transition from command and control to market economy approaches in forestry, and other changing values. Altogether this has led to a wide range of challenges in countries in transition. The primary condition for successful implementation of forest policy and legislation is a functional collaboration with direct and indirect forest users. However, low level of democracy in the political culture at re-gional and local levels are major reasons that the mechanism for influence of direct and indirect forest users on the forest policy has yet not been developed. According to the Forest Code (1994), citizens, their organizations, committee of self-governance have a right to discuss and participate in decision-processes concerning use, protection and res-toration of forests. However, in the Skole district there are no non-governmental organi-sations or informal institutions that could realise this right. Thus, public participation is not sufficient in the decision-making process, like in most forested areas of Ukraine where local population directly depend on forests and forest resources. These obstacles create a policy creation gap between ecological objectives of forest policy on national level on the one hand, and social-economic needs on regional and local levels on the other. Hence, the ecologically-oriented forest legislation in Ukraine does not work in practice at the local level. In a forest-dependent district, such as Skole, forests have to satisfy regional, ecological, economic and socio-cultural considerations.

Officially, only 3.6% of total population in Skole area is employed by forest en-terprises. However, a much larger proportion of the population is directly and indirectly dependent on the access to, for example, fuelwood, building material and non-wood products. Additionally, illegal cutting is a big problem. There is no official data about the amount of illegally harvested wood, but it is unofficially estimated that it amounts to about 30% of officially harvested amount of timber. A second set of obstacles relate to the policy implementation process. The main obstacle is a command-control system of policy implementation process (post-socialism) (fig. 2). There are overlapping and unclear legal and institutional arrangements between governmental institutions with respect to forest

policies. As a rule, because authority is assigned from the top to many actors, the functions and responsibilities between different actors are overlapping and contradictory, which gives a space for unprofessional decisions and corruption.

Lack of appropriate institutions constitute a major bottleneck for the sustainable development of the forestry sector in many post-soviet countries. The International Institute of Applied Systems Analysis (IIASA) has carried out a lot of efforts in analyzing the institutions of the Russian forest sector. The lesson learned is that there are limited possibilities to achieve sustainability without substantial changes and reforms in the existing institutions and the reforms needed must be in harmony with the establishment of the sustainability concept. Such conditions result in a policy implementation gap between the definition of SFM and how its different criteria and objectives are understood by the traditional forest sector. Interviews with local stakeholders in the Skole district, and analyses of statistical data allow us to make the following two conclusions. First, while the State is the main forest actor and has to implement policies through state forest enterprises, forest enterprises focus exclusively on economic dimensions of SFM because they do not get financial support from the government for ecological and socio-cultural dimensions. Secondly, while the forest legislation and forest programs promote principles of SFM, the local level forest managers do not understand the SFM concept, why it is needed and why it should be used.

The main reason of exclusively economic activity of forest enterprises is insufficient and insecure state investments in forestry. The forest enterprises works are subject to a range of controlling and demanding organizations, and have few rights and many responsibilities (fig. 3). This system of relations is typical for administrative system of governance and cannot be effective for the implementation of SFM. The income gener-ated by forest enterprises partly flows to the state budget, which is separated from them by time, space and institutions. As Krott et al. (2000) concluded for post-socialist coun-tries in general, these disintegrations imply large difficulties to coordinate the earnings with the necessary long-term investments in forestry production as well as technology and infrastructure. In the Skole district the lack of investments is a reason of low level of reforestation. Some forest enterprises are trying to support natural forest restoration through introduction of new methods of harvesting (for example, selective cutting). Regional industries of manufactured wood products, which give working places for local people and generate income for regional economy, are still in an embryonic state. During Soviet time, the Skole district was a manufacturing centre for manufactured wood products drawing wood not only from Ukraine and Russia, but even from distant lands, like Brazil and India. When the forest product industry and forest management were segregated during the reformation of forestry sector in 1995, the manufacturing industry was privatized and then went bankrupt. To develop SFM the forest enterprises have to introduce new rules of «game». Data from the Skole district shows that the volumes of harvested wood have been growing mainly due to an increase in the amount of timber intermediate felling. There are different reasons for this. One is poor forest health condition of forests with large volumes of trees dying from bark beetle (Ips spp.) attacks, which demands sanitary cuttings. Another reason is a desire to get more income from intermediate felling avoiding payments for commercial wood. At the same time «sanitation cutting» is a carte blanche for clear-cutting practices. It is a red flag that implies unregulated cutting under the guise of forest protection or silvicultural «smoke screen» allowing free reign to forest managers to cut at will.

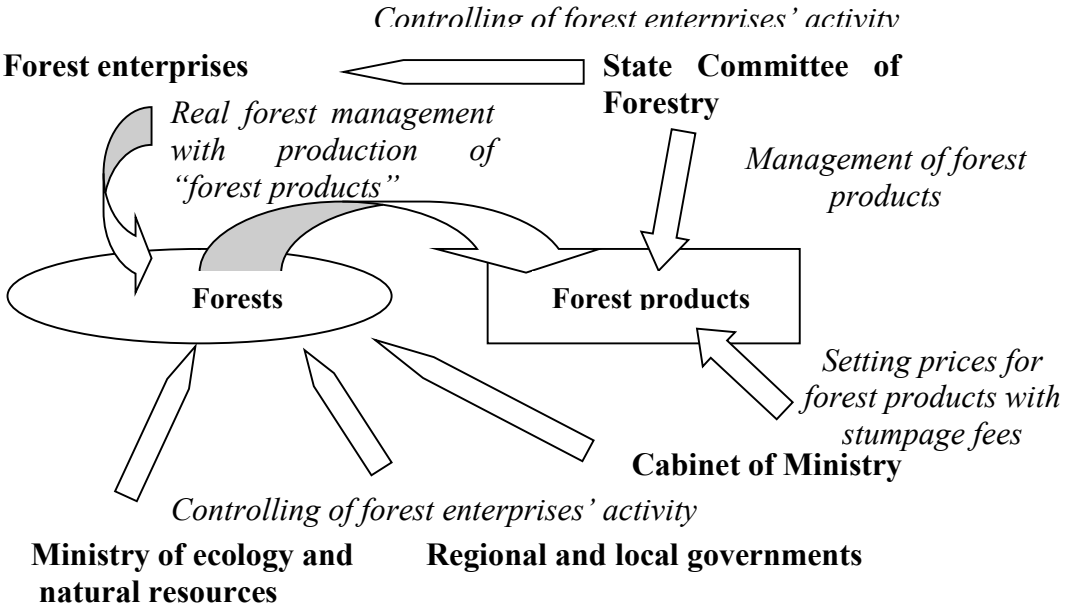

Fig. 3. Illustration of how state forest enterprises are surrounded by different controlling and demanding state organizations

The most economically viable enterprises, for example, the Skole forest enterprise «Skolivskyy derzlishosp» has refused to use budget financing and decided to cover all forest management expenses (plantation, tending, protection against illegal cutting, pests) from wood sale incomes. This is evidence that forest enterprises could be profitable at least in the most forested areas, in spite of a range of obstacles. A third set of obstacles for SFM implementation is related to the dominating theoretical and disciplinary scientific approach in forestry. Traditionally, Ukrainian silvicultural science and education were highly advanced. The currently poor economic performance in forestry is largely the con-sequence of a lack of proper communication, cooperation and reciprocity. For example, to improve ecological functions of forest ecosystems in Skole district, which was deteriorated during the course of history, it is necessary to apply contemporary ecological knowledge. However, collaboration between foresters and scientists is ineffective and unproductive without an appropriate financial support from the government. As a result there is a knowledge gap between needs of interdisciplinary knowledge and holistic approach for SFM implementation, and what is currently applied.

Discussion. Development of SFM in Ukraine. The transition since the independence of Ukraine in 1991, geopolitical changes in Eastern Europe, expansion of the European Union and globalization of the forest sector has changed the role of Ukrainian forests at national, local and regional levels. There are, however, several opinions about the role of Ukrainian forests today and in the future. The first is ecologically orientated, and declares that the forest sector in Ukraine does not have economic importance. Instead forests play a profound ecological function, and should therefore be appropriately protected, and harvesting practice should be reduced. The second is economically oriented. Their main thesis is that exploitation and forest management and harvesting intensity in Ukraine are lower than in most European countries. Thus, the forest sector utilization has to increase substantially to fulfil economic needs at national, regional and local levels. Finally, a third view is that forests have ecological as well as economic and social functions [8, 9]**.** Implementation of sustainable forest management according to the international discourse will help to combine these dimensions in forested landscape. The overview of Ukrainian forest legislation and programs show that they are oriented towards sustainable forest management, including all three pillars of sustainability.

The results from our attempt to initiate a multilevel analysis concur with previous studies [10], indicating that there are many obstacles in the process of implementing SFM. This has created different kinds of gaps between the aims of polices and results within actual landscapes.

Bridging the gaps. Interviews and analyses of official statistics show that: (1) Forest enterprises focus exclusively on the economic dimensions of SFM. (2) Local level forest managers do not understand the SFM concept and the reasons to follow its principles. (3) Even if only 3.6 % of the human population in Skole is employed by forest enterprises, forests play a vital social role and provides livelihood for more people. (4) The ecological functions of forests are degraded. Restoration is needed in many cases. Collaboration between foresters and scientists is not as it should. (5) The public opinion about foresters and forest management is negative. There is no mechanism for local users to influence forest practice in the area. Three types of gaps need to be bridged: (1) A policy implementation gap between the official definition of SFM, and how its different criteria and objectives are understood by forest actors. (2) A policy creation gap between the local level situation and ecological, economic and socio-cultural needs at the national and regional levels. (3) A knowledge gap between the need of a holistic transdisciplinary approach for SFM implementation and the present sectorial and disciplinary situation. Ways of bridging these gaps are capacity building, introducing arenas for co-management, and applying a zoning approach at multiple scales to satisfy economic, ecological and socio-cultural dimension of SFM.

While forestry in the traditional sense has a clear positive impact on maintaining forest resources, the impact on economic and social aspects in a given territory (landscape) are highly dependent on the economic status and history, and the systems for government and governance. In an increasingly complex and changing world there is a need for initiating relevant innovative research and development to disseminate existing and develop new tools in a toolbox for implementation, and as an interface between practice and policy. To implement SFM national forest programs should follow a broad inter-sectoral approach, including the formulation of policies, strategies, and plans of actions as well as their implementation, monitoring, and evaluation. The programs should be implemented in the context of a country's socio-economic, cultural, political, and environmental situation and be integrated with wider programs for sustainable land-use and with the activities of other sectors. Focusing on the local level in the Skole district, this study indicates that there are poor working connections between managers from different sectors. There are a national park, recreational zones and local villages. However, there are no real contacts between representatives for developing a common vision on local and regional development. Thus, even if forest programs are sufficient in a narrow sectoral context, they are not in a broader context. There are several ways of bridging the gaps. First, introduction of arenas for good governance which could provides a forum for involvement of a variety of stakeholders ranging from the land managers, the general public, and policy makers. Second, dividing land into different zones could help fulfilling economic, ecological and socio-cultural dimension of SFM. In Ukraine zoning approach for forest development on regional and local level is implemented by dividing forests into two groups. However, in Eastern Europe, including Ukraine, foresters and geographers generally developed zoning concepts, and socio-cultural issues were not considered. Because there are different kinds of forests with different dynamics [7] and socio-cultural values (ref xx), different kinds of zoning and subsequent management approaches are needed to maintain all kind of forest values.

Third, to implement concepts for integrated natural resource management concepts such as the Model Forest could be employed. This represents a way of establishing a

societal arena in the form of a partnership between individuals and organizations sharing the common vision of sustainable forest management [7].

Finally, one could initiate a learning process in the form of forest certification. There have been efforts from the Ukrainian Research Institute of Forestry Monitoring and Certification Laboratory to organize vocational training and to create a certification strategy for forests under the management of the State Committee of Forestry (SCF). The regional department of SCF in Lviv is discussing means of certification of forests in the Lviv region with financial support from the Swedish International Development Agency (SIDA) and other potential donors. There have also been ongoing discussions to include forest certification into forest regulations and the Forest Code.

There are many advantages of forest certification in Western Ukraine. Since forest enterprises conduct economic activity, the approval of management by means of certification could provide a more stable economic base. Forest products such as roundwood timber are primarily sold to European customers. The demand on certified forest products has increased significantly in the past four years in western markets. Comparing to Russia, the forested re-gions in Ukraine are located very close to western market and, for example forest enterprises in the Lviv region, already have close working contacts with wood processing enterprises in Slovakia, Poland and Italy. Certification of forest products could help to sustain a market share. The forests in Ukraine have an ecological role, and forest certification could contribute to moving away from unsustainable exploitation. Thus, the long-term natural capital and economic value of exploitable forests would increase. Finally, the transparency of the forest sector and participatory approach to forest management would be developed. It should, however, be clear that the quality of certification standard is the main factor determining the extent to which certification sufficiently contributes to sustainable forest management. Other policy instruments, such as protected areas and other legal approaches, will still be needed, along with dissemination of the state of different elements of the sustainability concept.

Towards a comprehensive research approach to SFM. Natural forests and cul-tural woodlands are the dominating forms of land cover and land use in Ukraine and a foundation for economic diversification as well as social and cultural welfare. However, differences in historical development, environmental factors and cultural traits have resulted in variability in attitudes and practices. It is an important aspect to synthesise, and learn from this variability. To fully understand the role of forested landscapes in re-gional and local development we argue that transdisciplinary research using the multiple case studies should be conducted. The basic working unit for such transdisciplinary research should be a social-ecological system, such as landscape-scale areas located in different natural zones and in a gradient from centres to peripheries of economic development [7]. To provide empirical information regarding how SFM is perceived and implemented in post-socialism countries we propose to implement case studies for trans-disciplinary researches in forested landscapes in different parts of Ukraine.

As a complement to our case study in the Carpathian Mountains we suggest that such research could be conducted in the Polesian lowlands, the forest steppe and Crimea [3]. However, to represent both zonal and azonal ecoregions as well as a diversity of po-litical, economic and social conditions also studies in other countries have been initiated. The approaches to assess ecological dimensions of SFM in local landscape are well de-veloped [7]**.** These include tools such as gap analysis for strategic planning, habitat mod-elling for tactical planning, and selection of silvicultural practices. Similarly, there are tools for developing public participation. In addition there is a need for development of systematic approaches for understanding the interaction between socio-cultural compo-nents of SFM

within forested landscapes. How do ecological, socio-cultural and eco-nomic dimensions interact and how this contributes to human welfare and quality of life? For this purpose it is essential to join efforts of representatives from natural, social and human sciences as well as policy-makers and local stakeholders. We believe that such a comparative approach based on multiple case studies will reveal a number of unexpected similarities between localities superficially quite different in terms of environmental, social and political features. Such similarities can be used to formulate guidelines of more general value, thus promoting the process of developing sustainable forest management.

Acknowledgements. This paper developed as an outcome of the COST action E25 (European network for long-term forest ecosystem and landscape research). We are grateful for the support provided through Folke Andersson to take part in this network. Financial support was provided to PA from «Stiftelsen Marcus och Amalia Wallenbergs Minnesfond». Robert Axelsson, Marius Lazdinis, Maria Nijnik and Camilla Sandström provided valuable comments on the manuscript. Special thanks are for Maksym Polyakov and Tim Sidor for their constructive comments and edits of the manuscript.

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На шляху до впровадження сталого управління лісами – від політики до ландшафту і навпаки

Для забезпечення сталого лісокористування (СЛК) на ландшафтному рівні творці лісової політики, менеджери та лісокористувачі повинні бути забезпеченими емпіричною інформацією щодо того яким є ставлення до різних аспекти СЛК і як вони розробляються на місцевому рівні. У цій статті обґрунтовано необхідність здійснення міждисциплінарних досліджень на підставі аналізу багатьох конкретних об'єктів для поглиблення розуміння ролі лісових ландшафтів у регіональному розвитку. Заради підтвердження доречності застосування запропонованого концептуального підходу здійснено огляд стану і тенденцій СЛК в Україні, , яка є одною з пострадянських країн, що здійснила перехід від соціалістичної планової до ринкової економіки. Спочатку було розглянуто національну політику, що має значення для лісів і лісового господарства, і описано процес формування політики на інституційному рівні – тобто як впроваджується політика «зверху вниз». Використовуючи Сколівський район в умовах Карпатських гір за приклад для аналізу стану СЛК, оцінено діяльність щодо формування політики в межах процесу «знизу вгору».

Український уряд є основним розпорядником лісів і реалізує політику в рамках національних, регіональних і місцевих установ, а також державних підприємств лісового господарства. Ця багаторівнева система реалізації політики припускає командно-адміністративний підхід управління «зверху вниз» лісовим господарством. Отже за такого підходу, шлях для впровадження будь-якої ініціативи є дуже довгим – від низового рівня, тобто тих одиниць, які безпосередньо здійснюють менеджмент лісового господарства і до рівня підрозділів формування політики. Тому, засадничо, це спричинює відсутність ефективного діючого механізму впливу лісокористувачів на формування лісової політики. Аналіз інтерв'ю та офіційної статистики свідчить, що: по-перше, лісові підприємства зосередили діяльність виключно на економічних аспектах лісокористування, по-друге, місцеві лісівники не розуміють всю ширину концепції СЛК, а тому не бачать причин слідувати її принципам, по-третє, хоч тільки 3,6 % населення Сколівського району працевлаштовані на підприємствах лісового господарства, однак ліси відіграють життєво важливу соціально-культурну роль і надають засоби існування для все більшої частини населення, по-четверте, екологічні функції лісів піддаються деградації та потребують в багатьох випадках відновлення. Співпраця між лісівниками-практиками й вченими ще не є достатньо ефективною, по-п'яте, громадська думка про лісівників і стан лісокористування є почасти негативною. Відсутній механізм впливу місцевих лісокористувачів на ведення лісового господарства у їхній місцевості. Три типи недоліків необхідно подолати: (1) невідповідність між офіційним визначенням політики СЛК і тим як різні критерії та цілі СЛК розуміються суб'єктами лісових відносин; (2) невідповідність між творенням політики, виходячи з місцевої ситуації, та екологічними, економічним і соціально-культурними потребами на національному та регіональному рівнях; (3) інформаційні неузгодження між потребою в цілісному міждисциплінарному підході для здійснення СЛК і сучасною ситуацією в лісовому секторі, а також обмеженими дисциплінарними рамками дослідженнями. Подолання цих недоліків потребує розвитку потенціалу, апробацію моделей спільного (узгодженого) управління, а також застосування зонального підходу з урахуванням специфіки місцевих умов з метою охоплення економічного, екологічного та соціально-культурного аспектів СЛК.

Ключові слова: стале управління лісами, лісові ландшафти, управління, лісова політика, інтегрований менеджмент, багатоаспектні дослідження об'єктів.