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# PRINCIPLES OF SUSTAINABLE FOREST MANAGEMENT IN THE FRAMEWORK OF REGIONAL ECONOMIC DEVELOPMENT

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The Skolivsky Beskydy National Nature Park (SBNNP) is one of Ukraine's newest national parks carved out of the mountains, woodlands and agricultural areas of the eastern Carpathians in the late 1990s. 60-80% of the park territory is forested, hence, to understand the potential development of the park as a functioning protected area that offers recreation, ecosystem management – including watershed protection and the preservation of biodiversity – and job opportunities for rural development, it is important to understand the modern principles and criteria of sustainable forest management (SFM) within the framework of regional economic development.

Over the last decade, the roles of forests in the cultural, economical and political aspects of society have changed. Society in many western countries now demands adequate comprehension for social and ecological importance of forests by regulating the functions of commercial forest sector and providing for the interaction of all stakeholders to increase the sustainability of forestry. With the nearly total breakdown of the Ukrainian forest products industry in the 1990s, the government and industry have the opportunity to work together with a nascent NGOs (non-governmental organizations), trade associations, rural communities and civic organizations to re-build the forest industry on a sustainable production model. Recently, the forest products industry has recovered and is undergoing a marked growth revival. Now is the time to incorporate elements of sustainability into the forest sector – including ecosystem management of protected areas like the SBNNP.

Access to natural resources that generate income and jobs in local communities needs to be balanced with protection and preservation of habitat and natural resources. The principles described in this paper are generally accepted theories that are being incorporated in protected area management of forested areas throughout the world. It is a complex issue that entails more than traditional forest management practices for consumptive forest products or park development for ecotourism and recreation. It is a landscape level strategy for the conservation of natural resources and the role of community-based, collaborative management from a transparent ecological standpoint that needs to be incorporated into a regional and national program for ecosystem management in the 21st century.

*Key words:* Carpathian Mountains, certification, community-based collaborative management, forest policy, forest ecosystem, protected area management, reduced impact logging (RIL), sustainable forest management (SFM), value-added manufacturing, wood products.

***Introduction***. Forests play an important role in the economic development, cultural and social aspects of life in Western Ukraine. Although the "Skolivsky" Forest Preserve has existed since 1983, the Skolivsky Beskydy National Nature Park (SBNNP) was not created until February, 1999. It is one of Ukraine's newest national parks and it was carved out of the mountains, woodlands and agricultural areas of the pre-Carpathian or Carpathian Front and the Carpathian massif approximately 90 km south of the Galician city of Lviv. The park's territories have different land use histories and were under the administration of different public agencies in the Lviv oblast. Nonetheless, SBNNP is one of only two national parks directly under the jurisdiction of the State Committee of Forests of Ukraine (SCFU); the Ministry of Environmental Protection, and approximately 60-80% of the territory of park is forested. Hence, to understand the potential development of the park as a functioning protected area that offers recreation, ecosystem management – including watershed protection and the preservation of biodiversity – and job opportunities for rural development, it is important to understand the modern principles and criteria of sustainable forest management (SFM) within the framework of regional economic development.

***Background.*** A number of factors since the Independence of Ukraine in 1991, including geo-political changes in Eastern Europe and growing internationalization have caused a change in the importance of Ukrainian forests at the local and regional level. Deterioration of the standard of living, the collapse of the planned economy and economic stagnation that followed the collapse of the former Soviet Union (FSU), resulted in negative pressure on natural resources including the exploitation of forests. Another factor that has impact on the forest sector in Ukraine is its relatively large population – approximately 48 million people – many of which are directly or indirectly dependent upon the health and productivity of their woodlands. Legal and illegal extraction of forest products, both wood and non-timber products (NTFP), have become a vital source of income and subsistence for a large village population (about 15.7 million people or 31,5% of the population), who live in close proximity to forests and whose livelihood or health depends upon them (Zibtsev, 2004).

Forest product manufacturing dropped precipitously from a post-war high in the 1970s to the stagnation and total disruption to the Soviet system at end of the 1990s. Despite the official data, the 1990s saw an increase in illegal logging and highgrading of roundwood (raw sawlogs), especially valuable hardwood species such as beech and oak which were intensively exploited by state and private forest enterprises that harvest wood for trade, export and wood processing. In 2002, as much as 80% of wood was harvested for export in roundwood form. Because of failing control mechanisms, the pressure for rapid income and hard currency, the level of unauthorized or illegal felling increased dramatically – with as much as 65% of the wood originating from illegal or uncontrolled timber harvesting (Maximets, 2004). Along with the intensive anthropogenic pressure caused by the complicated transition to a market economy, almost all Ukrainian forests have historically been under the impact of industrial air pollutants emitted from local sources (i.e. factories producing nitrogen fertilizers, sulphur, chemical plants, coal-fired electric power stations, etc.) and, in terms of wetland forests, regional agricultural ameliorations (i.e. drainage and canalization which has resulted in irreversible hydrological changes).

Over the last decade, the roles of forests in the cultural, economical and political aspects of society have changed. Society in many western countries now demands adequate comprehension for social and ecological importance of forests by regulating the functions of commercial forest sector and providing for the interaction of all stakeholders to increase

the sustainability of forestry. With the nearly total breakdown of the Ukrainian forest products industry in the 1990s, the government and industry have the opportunity to work together with nascent NGOs (non-governmental organizations), trade groups, rural communities and civic organizations to re-build the forest industry on a sustainable production model. Recently, the forest products industry has recovered and is undergoing a marked growth revival. Now is the time to incorporate elements of sustainability into the forest sector – including ecosystem management of protected areas like the SBNNP.

***Importance of Forests and the Forest Products Industry in the Local Economy.*** In terms of forested area, only 15.6% of Ukraine's terrain is covered with forests (FAO, 2002). Although, the mean forested area of Europe is three-times greater (46%), Ukraine – the largest country in Europe after Russia – has considerable forested territory; approximately 10 million hectares. On the European scale, Ukraine's overall forest area ranks ninth (9th) out of 40 countries in Europe and eighth (8th) in terms of total carbon stock of woody biomass (UNCE/FAO, 2000). In terms of forest productivity, Ukraine has some of the most productive forest soils in Europe. Based on the mean stocking levels of forest stands (m3/ha), Ukraine ranks higher than Finland, Sweden, and Russia. Therefore, despite its low forest cover, Ukraine has significant forest resources and is competitive with some more densely forested countries with highly developed forest product industries such as Poland, Austria, and Finland.

The forested area of Ukraine is unevenly distributed between mountain forests, northern forests (Polissiya), forest steppe and steppe. Furthermore, when you analyze the regional picture, the percentage of forest area in western Ukraine is considerably higher, up to 40% and higher in the Carpathian Mountains (Hensiruk *et al,* 1992) approaching the desired norm of one-third of the landscape. The topography of the eastern Carpathians of Ukraine is dominated by low mountains (1000-2000 m), foothills and valleys with geologically old soils and a continental climate marked by abundant precipitation. Depending on site, elevation and land use history, the terrain is covered with productive, hardwood, conifer-mixed hardwood and conifer forests.

***Forest ownership patterns.*** The forest area of the Lviv oblast occupies approximately 689,900 hectares – about 28% of the region and 9% of the forest area of Ukraine. About 38% of the land of the Lviv region is covered by mountain forests (163,300ha) belonging to the SCFU, which control three quarters of the region's forests (478,200 ha). The former kolhosp forests or collective farms, municipal forests under the jurisdiction of the Ministry of Agriculture, the Ministry of Defense and other ministries make up the remainder. The structure of the State Forestry Association "Lvivlis" includes 16 state forestry enterprises (derzhavnij lisohospodarstva – derzhlishosps or forest districts), one national natural park and five state hunting farms make up the forested area in Lviv oblast. The Slavsk Derhzlishop is highly regarded not only in the Lviv oblast, but recognized throughout Ukraine and beyond its borders as one of the best managed forest administrative units in the region. The forest area of the SBNNP is approximately 35,684 ha or 60-80% of the terrain of the Park.

***Historical Importance of Forest and Traditional Wood Products.*** For the better part of the first millennium, the region that is now western Ukraine was virtually all covered with primeval forest. Up until the 16th-17th centuries there was relatively little anthropogenic disturbance to the forest ecosystem and the region was extensively wooded. The Carpathian Front and Carpathian Mountains were once covered with virgin stands of

mixed hardwoods, primarily oak and beech, and spruce-fir forests. The 18th century saw rapid development and clearing of forestland for agriculture and pasture. The onset of the industrial revolution of the 19th century saw the unrelenting exploitation of forest resources for building materials as well as the large scale deforestation for firewood and charcoal for iron making, potash, glass works, saltpeter etc. (Hensyruk et al, 1998). In the mid-19th century, the Austro-Hungarian regime introduced the concept of modern forest management and industrial forestry with extensive planting of monocultures of spruce (Piceas abies) of Austrian geographic origin. Although extremely productive on good sites, these provenances are now considered "off site." Along with global climate change and atmospheric deposition, these provenance factors are being implicated in causing stress and mortality in spruce plantations. These anthropogenic and natural disturbances are contributing to a spiral of forest decline and pre-disposing stands to other causal agents mortality such as the large-scale infestation of root rot in spruce stands of the Carpathians – particularly in the Lviv oblast.

Like other parts of Eastern Europe, NTFPs 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. With the exception of game, these have been largely unregulated in Ukrainian forests.

***Wood Products Manufacture and Processing.*** The production of primary and secondary wood products is the driver for most forest management activities. Primary products usually include roundwood (i.e. logs) for sawtimber, veneer, pulpwood for domestic or export markets. Secondary wood products run a broad spectrum of products from kiln-dried, surfaced sawnwood, panelboard products (Medium Density Fiberboard – MDF; Oriented Strand Board – OSB; hardboard, particleboard, etc.) pulp & paper products, furniture, furniture components, wood accessories, etc. During the FSU period, Western Ukraine was a manufacturing center for secondary wood products, primarily furniture and panelboard products drawing wood not only from the Ukrainian Polissiya and Carpathian timbershed but northern Russia and as far as central Siberia. In 1995, after the collapse of the FSU, an abortive attempt by the local government to introduce privatization of state forest products industries (lisokombinants) resulted the segregation forest management from manufacturing by transferring all commercial forest land to the control derzhlishosps (as opposed to the liskombinants) in three oblasts of Carpathians: Transcarpathia, Ivanno-Frankivsk and Chernivtski. This inadvertently, contributed to the wholesale demise of the manufacturing and sector shift to the uncontrolled extraction of roundwood primarily for the European market. This concept met with limited success in the Lviv oblast and many of these wood-manufacturing enterprises such as the Skolje Forest Enterprise have been re-purchased by the derzhlishosps.

The goal of sustainable forest product industry is the maximum utilization of fiber. This includes timber harvesting operations and processing of wood products. Utilization of appropriate technology – whether that is horse logging or skyline cable systems and efficient operations management are part of the equation. This may include use of local labor and, in the case of construction and wood consumption, using native materials and utilizing fiber to its highest and best value. Because of economic reasons, high quality sawtimber material is rarely used for chips or firewood but secondary sawlogs or lesser-used species may go to pulpwood or fiber instead of the highest and best value products because of the lack of markets and/or the insufficient investment in product development (McGrath, 1994).

Until 2002, the majority of wood harvested in Ukraine continued to be exported as roundwood adding no value to the community or local economic development. Export of

low-grade softwood material for pallets and industrial dimension for export markets to Western Europe (Germany and Italy), Turkey and the Middle East. Adjoining Slovakia has made significant capital investments in forest processing and is one of the major importers of Ukrainian roundwood were it re-manufactured for higher value products such as kiln-dried lumber, furniture components and other value-added wood products exported for Western Europe. In the last several years, internal demand and increased interest and demand in Western Europe, a turnaround in the Ukrainian forest product sector. Prolonged "highgrading" – removal of the largest and highest value materials from the forest stand – will have implications on forest management and the tightening supply of high quality wood products

***Elements of Sustainable Wood and Non-Wood Production.*** How do you define a sustainable forest products industry? The concept of a sustainable forest products industry is a closed loop: it is defined by a holistic stewardship of renewable forest resources throughout the chain of production from seeding and cultivation of forests to harvesting of wood and non-wood products to marketing of finished products and recycling of discarded materials. In order to protect biodiversity and wildlife habitat and restore the health and productivity of the forest ecosystem, SFM practices and environmental production are linked along the continuum. Some of the mechanisms to stimulate manufacture and marketing of sustainably harvested forest products include:

- Value-added production.
- Third-party certification.
- Utilization of small-diameter material and lesser-used species.
- Green marketing.
- Appropriate technology.
- Alternative materials.
- Clean production technologies.
- Recycling.

Each of these factors is interwoven and efforts to promote these components will encourage not only the development of sustainability but also a vibrant forest products sector. The short-term goals are not only to encourage large-scale investment in manufacturing but also to generate medium- and small-scale value-added, income-generating industries for rural development (McGrath, 1994). Since the breakup of collective farms and demise of large wood using industries, shrinking job opportunities have resulted in severe unemployment and out migration from rural areas in Transcarpathia and Western Ukraine. The slow attrition of labor from villages and towns of the Ukrainian Carpathians may be reversed or at least abated with the creation of local opportunities for wood-based cottage industries and training to increase the community capacity for forest stewardship – including timber harvesting and transport– eco-tourism and watershed restoration.

In terms of third party-forest certification, Ukraine is still lagging behind Europe and the rest of world including developing economies in Latin America and Asia. However, the last three years have seen rapid interest and progress in this area. As of 2004, about 400,000 thousands hectares of government forest have been certified (Institute for Marketecology, 2000). With the aid of the World Bank World Wildlife Fund Alliance, the Swedish International Development Agency (SIDA), Swiss Development Agency and other donor organizations, initiatives for certification have been increasing. A series of conferences and workshops has resulted in debates over the benefits and nature of certification – the Pan European Forest Certification (PEFC) versus the Forest Stewardship

Council (FSC) – and the creation of a national forest standards committee for the development of forest management indicators based on the established FSC principles and criteria (http://ncsu.nauu.kiev.ua). Although interest from the industry is embryonic, external pressure for environmentally sound forest products for the Western European markets is causing individual firms to turn to green marketing to increase their market penetration and access to these lucrative markets. Integration into the EU and potential restrictions are motivating some companies to look at certification. There have been efforts from the Ukrainian Research Institute of Forestry Monitoring and Certification Laboratory (UkrFRIM) to organize disperse efforts and create a certification strategy for SFCU (67% of forested land in Ukraine). LvivLis is discussing with certification of forests in the Lviv oblast with the support of SIDA and other potential donors that would underwrite the costs of certification. There have also been ongoing discussions to include forest certification into forest regulations and the Forest Codex.

***Conservation Strategies.*** As pressures on forest resources increase, creating opportunities for sustainable development and determining conservation goals remains a priority. Without zoning and regional planning, the mountain landscapes of the Carpathians face development and recreational pressures that will result in forest fragmentation and visual destruction of the "working landscape" of forest and fields. Another challenge is forest dieback. The forests of the Lviv oblast are currently undergoing pockets of large-scale dieback of spruce from undetermined sources. Transcarpathia has the largest concentration of protected old-growth or "virgin" beech forest in Europe (Chernyavskyy, 2004). Declining forest health and protection of the remaining old growth is part of the larger ecosystem management of protected areas including SBNNP. Having proper inventory and geographic information systems (GIS) are part of the protective measures that need to be in place for scientifically-based decision making and part of the regional conservation strategy.

***Forest Policy Reform and Legislation.*** The Ukrainian forest sector is on the threshold of fundamental reformation. The main features of the future restructuring include a change in the management, exploitation, and control of forests with the potential creation of private and communal patterns of forest ownership (Zibtsev, et al, 2003). According to 2000 UNCE/FAO data, Ukraine along with Russia, Moldova and Belarus have virtually no private forestland – the lowest share of publicly and privately owned forest and other woodland in Europe. Ukrainian academics and forest sector experts have differing opinions as to the share of forests that should be allowed for privatization in case the new Forest Codex and Laws allowing forest ownership is adopted (Soloviy, 2003). Although most forest resource professionals agree that the privatization is inevitable, different opinions predict different scenarios. They vary from the total ban on forest ownership to the privatization of large territories of low-quality agrarian forests (former kolhosp landholdings – up to 24% of the total forest territory) and a part of the commercial high-quality forest enterprises.

The widely discussed problem of whether to allow private ownership for forests in Ukraine is overshadowed by the more important problem on how the state shall form an infrastructure of sustainable management in private as well as public forests including: enforcement of laws and penalties, crediting, compensation, control methods and regulations, introduction of modern forest harvesting technology, silvicultural training, extension and education for the new forest owners, etc. The formation of clear forest policy with input from forest resource professionals and not political forces in critical.

Decentralization of forest management, along with privatization, will create incentives for private sector investment in forest management and processing. Enforcement of existing laws and penalties that inhibit abuse of forest management are as important as creating a new set of laws without force.

The process of privatization and restitution has continued for ten years in Eastern Europe, with some negative experiences (FAO, 2004). If forests are transferred without appropriate infrastructure, controls and education, the rise of liquidation cutting and illegal cutting is inevitable. This was the initial situation in Romania, where about 10% of forests transmitted to new owners were cut illegally (Zibtsev, 2004).

Concurrently, with the growth of the private sector (both landowners and industry), creation of non-governmental organizations (conservation organizations, trade associations, forest trade organizations) that are concerned with the protection, utilization and health of forests is important. Their role in the stewardship of public and future private forests is unclear. Public relations information about sustainable forest management and certification needs to convey to a skeptical public that sees timber theft, clearcutting, under-the-table forestland deals and abusive land practices as the norm instead of the benefits of sound forest stewardship.

Since 1960, two million hectares of forestland has been added to the Ukraine landscape. According to Ukrainian forest regeneration planners, an additional (approximately) five million hectares of eroded, poor quality farmland is suitable for afforestation in Ukraine. Afforestation of marginal agricultural lands is tied to privatization of these former farmlands. With government subsidies and support, abandoned or poor quality farmland could be converted to protective forest – naturally regenerated woodlands for wildlife and water protection or private sector, intensive fiber plantations for biomass. A financial analysis of these options needs to be presented to decision makers. Models for plantation forestry abound in temperate forest countries. An austral country like Chile had no history of exports of forest products until the late 1970s. Although the site and growing conditions are significantly different, government policy created a forest products industry through research, generous industry subsidies and tax incentives for private forestland owners for the establishment of forestland on abandoned agricultural lands. Chilean environmentalists claim it was through the conversion of native forest and any attempt at the development of large-scale fast-growing monocultures should be viewed with caution.

Another option for tree cover is the establishment of commercial nurseries and Christmas tree plantations. Most Ukrainian Christmas trees come from poorly formed, spruce wildings cut from the understory of mountain forests. The adoption of Christmas trees or nursery stock and agroforestry techniques are alternative strategies for increasing the percentage of forest cover. The potential for one to five hectare Christmas tree plantations remains unexplored but could potentially provide farmers with alternative off-season income and encourage some larger private enterprise plantations to be established.

The creation of a coherent national forest policy is a priority of the Ukrainian forest reform. These laws are currently under revision and the forestry laws and tariffs should be crafted to encourage landscape-level forest stewardship on the mosaic of landholdings, community-based forestry and the creation of economic stimuli to promote investment and growth of an environmentally sound industry. Forest policy should encourage inter-agency (ministerial) cooperation and agreement. The codification of best management practices (BMPs) in accordance with Pan-European standards should accompany the stepwise implementation of forestland privatization. The decentralization of governmental forest structure will be a central challenge; control of forest resources and

processing at the forest enterprise (derzhlishosp) level is the working model that employs some 100,000 people in the forestry sector. Wholesale dismantling of the system is not a realistic or preferred option but an increase of local control of forest resources and increase of private investment needs to be part of the overall forest management structure.

***Principles of Sustainable Forest Management (SFM).*** SFM is defined as the process of incorporating economic, ecologic and social aspects into long-term forest management according to accepted principles and criteria of sustainable forestry (FSC, 2000). In Ukraine, forest management has deteriorated partly as a result of financing shortfalls, partly by entrenched forest policy. SFM is a landscape-level forest management system that includes active silvicultural practices and protection.

Timber Stand Improvement (TSI) - Thinning, crop tree release, prescribed burning, pruning, etc. are all traditional intermediate silvicultural practices that improve the quality and health of the stand. The majority of Ukraine's forests (44%) are in the small poletimber or small sawtimber stage. Since the fall of FSU, thinnings are inadequate and forests are increasingly vulnerable to outbreaks and fires. Markets or low-grade timber and small diameter thinnings is a universal challenge of forest management, whether you are working in the tropics or boreal forest, and markets for these materials have not recovered (Peters, 2002).

Natural regeneration and natural forest management. In terms of regeneration, Ukraine relies almost exclusively on artificial regeneration and seeding – primarily coniferous species. Ukraine is slowly adopting strategies for natural regeneration, but according to 2000 UNCE/FAO data, less than 5% of Ukrainian forests are regenerated naturally. The option of natural regeneration, enhanced by planting is one of the most attractive and realistic options for Ukrainian forests. Another critical strategy is afforestation of marginal agricultural lands which are abandoned or underutilized. The creation of reliable commercial or government seed banks from improved seed selected from appropriate provenances does not exist. Experimental seed orchards have been established but seed sources for reforestation are rarely known and usually rely on unimproved, local seed sources for district nurseries (*rosdaniki*).

Integrated Pest Management (IPM). The term "sanitation cutting" or salvage has assumed a negative connotation in the West. Although the practice is a legitimate, prophylactic silvicultural treatment to prevent damage from catastrophic fires or pest damage, the environmental community interprets these terms as *carte blanche* for clearcutting. From the green perspective, it is a red flag that implies unregulated cutting under the guise of forest protection or a silvicultural "smoke screen" allowing free reign to forest managers to cut at will. Due to traditional forest practices and historic principles of silviculture as well as the obvious fire hazard and aesthetic reasons, leaving snags or allowing for natural process of decay and forest recovery to occur are not acceptable for Ukrainian forest management systems. Regulation of the spatial and temporal distribution of clearcuts or utilizing small patch cuts and limited selective sanitation harvesting needs to be analyzed as part of an integrated pest management program.

**Best Management Practices and Reduced-Impact Logging.** Inappropriate logging and road building techniques continue to be one of the greatest obstacles to sustainable forest management (SFM) in the mountain forests of western Ukraine. Cutting streamside buffer zones, skidding across rivers and up riverbeds, point-source pollution, and the reliance on obsolete or incompatible timber transport technology are among the poor logging practices that plague current forestry operations. Decreased site productivity, soil compaction, sheet and gully erosion, mass movement, sedimentation, decrease in water quality and fisheries habitat are just the surface manifestations of these poor logging

practices. Disruptions to the landscape ecology – wildlife corridors, migration patterns, forest health, the increase in threatened and endangered species and resultant decline of biodiversity are part of the larger challenge of protection of the mountain forests of the Carpathian ecozone.

At the landscape level, the key to creating higher biodiversity is to treat the landscape so that all elements of the forest are retained at all times. For example, the streamside management zone is perhaps the most important landscape level strategy for protecting biodiversity. A "reserve zone" is an area where no active management occurs whereas a "management zone" is an area where management does occur, but with special consideration for the stream or river. Another feature that can be employed are interconnected corridors of forest that can be used to join streamside reserve zones. Wetlands protection and erosion control measures in the form of silt fences, water bars, broad-based dips or the use of portable bridges are standard operational practice in industrialized countries and little in evidence.

Creating a set of enforceable forest regulations or Best Management Practices (BMP) for timber harvesting operations and implementing these practices is a challenge for the forest sector in Ukraine. Harvesting schedules should be based on the applications of modern mathematical programming techniques determined by site, the allowable cut and the cutting budget over multiple rotations or cutting cycles (Leuschner, 1990) – not strictly on economic needs. Another challenge is the adoption of environmentally sound timber harvesting practices better known as Low Impact Logging (LIL) or Reduced-Impact Logging (RIL). RIL is primarily associated with SFM and precision timber harvesting in tropical countries. To a large extent, these RIL technologies are utilized as a matter of routine operations in temperate countries and represent nothing new. Nonetheless, the differences between industrialized countries with a developed forest product industry and countries with transition economies like Ukraine are substantial and the parallels with developing countries make a preliminary examination of the applicability of RIL worthwhile.

According to the conceptual framework of RIL, SFM requires the implementation of silvicultural practices that reduce the site disturbance caused by commercial timber harvesting. RIL is made up of three elements: 1) planning; 2) training; 3) appropriate technology. Functional aspects of RIL and its appropriateness in the Carpathian Mountains that are examined in cursory detail include: road building, costs, training and supervision, improving harvest recovery, harvesting equipment and timber transport machinery, decision support systems and inventory tools. An analysis of RIL methodology as a model to adapt to local economic and environmental conditions is worth investigation. RIL is an evolving model – labor costs change, logging technology changes, the industrial demand changes and environmental perspectives change. Hence, foresters and logging engineers have to stay current and practices have to be flexible to have a lasting impact. RIL offers a potential strategy for transforming the poor logging practices into efficient, “precision” logging, conserving soil, minimizing residual damage and slowing degradation of mountain forests in the Ukrainian Carpathians.

***Conclusions.*** Ecosystem management of protected areas is an ongoing challenge throughout the world, let alone newly created administrative park units in Ukraine’s transition economy. The fundamental challenge of ecosystem management in the SBNNP is the protection of biodiversity, the renewal of the degraded components of the ecosystem and sustainable development of the entire protected territory. Because of the dwindling traditions of the indigenous Boy’ko culutre and the large-scale out- migration for getting

jobs, the preservation of cultural heritage and the creation of economic oppoturinities in rural areas are additional priorities.

Protection of biological and landscape diversity is impossible without a network of the well-protected territories with measures in place for their preservation and maintenance. The essence of the problem, which is pressing not only for the SBNNP ecosystem, but all Ukrainian national parks, consists of the fact that most of the protected areas have a long history of alternative land use and changes in the environment in this region have been an ongoing process of degradation due to the influence of both anthropogenic and natural factors. Only over the last quarter century, has the Western concept of a "national park" been implemented on a larger scale in the territory of Ukraine. In many protected areas disturbance in ecosystem functions, especially in the highly sensitive habitats, has led to the rapid decline of the biosphere's restorative capacity negatively influencing the climatic and hydrological regulation role of forests. Critical management decisions and planning are only possible based on access to reliable, up-to-date information available through advanced information technologies and decisions made based on applied ecological research and community input.

The SBNNP is primarily a forested ecosystem interspersed with open areas of pasture and agricultural land. SFM is critical to the long-term term management of the protected area including the preservation of cultural resources and economic development of rural mountain areas in Western Ukraine. Access to natural resources that generate income and jobs in local communities needs to be balanced with protection and preservation of habitat and natural resources. The principles described in this paper are generally accepted theories that are being incorporated in protected area management of forested regionss throughout the world. It is a complex issue that entails more than traditional forest management practices for consumptive forest products like timber, game, mushrooms, etc. or park development for ecotourism and recreation. It is a landscape level strategy for the conservation of natural resources and the role of community-based, collaborative management from a transparent ecological standpoint that needs to be incorporated into a regional and national program for ecosystem management.

Thus, placed in perspective, one of the primary approaches of SBNNP activity is the development and introduction of scientifically well-grounded methods for preservation of protected area under conditions of multiple uses: scientific research, recreation, tourism, agriculture and forestry. Selective, piecemeal monitoring, absence of complex ecosystem analysis, and limited application of modern information technologies do not provide adequate decision tools for sustainable management of the Park's territory as a whole and functioning of its component parts, namely: agricultural production, recreational policy and natural resource protection. National and international experience of maintaining and protecting the functions of the protected areas, clearly shows that these tasks can be realized only with the active employment of modern information technologies for management of these territories. Concurrently, it is necessary to carry out zoning in the territory of the SBNNP to combine the tasks of biodiversity preservation, sustainable development, ecosystem research, training and education of personnel and local populations. The realization of the goals for the SBNNP in the 21$^{st}$ century will require the efforts of diversity of forest resource professionals, government agencies, social anthropologists, planners and local populations that created the working landscape needed to establish a common goal of protected areas ecosystem management for generations to come.

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# ПРИНЦИПИ СТАЛОГО ЛІСОВОГО МЕНЕДЖМЕНТУ В РАМКАХ ЕКОНОМІЧНОГО РОЗВИТКУ РЕГІОНУ

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Національний природний парк (НПП) "Сколівські Бескиди" – це один з наймолодших національних парків України, створений наприкінці 90–х років XX ст., який охоплює гірські лісові ландшафти та сільськогосподарські території східних Карпат. Оскільки 60–80% території парку становлять ліси, необхідно зрозуміти сучасні принципи та критерії сталого лісового менеджменту (СЛМ) в рамках економічного розвитку регіону для того, щоб побачити перспективи його розвитку як функціональної природоохоронної території, що дає можливість розвитку рекреації, екосистемного менеджменту (включаючи охорону вододілів та збереження біорізноманіття), а також створює нові робочі місця.

За останнє десятиліття змінилася роль лісів у культурному, економічному та політичному житті суспільства. Сьогодні у багатьох західних країнах суспільство вимагає адекватного розуміння соціального та екологічного значення лісів шляхом регулювання функцій комерційного лісового сектора та співпраці усіх зацікавлених сторін для підвищення стійкості лісового господарства. Після занепаду лісової промисловості України з'явилася можливість працювати з новими неурядовими організаціями, асоціаціями виробників та дилерів, сільськогосподарськими спілками та громадськими організаціями з метою перебудови лісового господарства на основі сталої промислової моделі. Останнім часом лісова промисловість дещо відродилася та помітно розширилася. Тепер настав час підвищити рівень стабільності в лісовому секторі, включаючи екосистемний менеджмент таких природоохоронних територій, як НПП "Сколівські Бескиди".

Використання природних ресурсів, які приносять дохід та забезпечують робочі місця, необхідно збалансувати з їхньою охороною та збереженням. Описані принципи – це загальноприйнята теорія, яку застосовують у природоохоронному менеджменті лісів у всьому світі. У цьому складному процесі використовують практику традиційного лісового менеджменту для споживацького лісового господарства, забезпечують розвиток парку для екотуризму та рекреації. Це стратегія ландшафтного рівня для збереження природних ресурсів та ролі спільного общинного менеджменту з "прозорої" екологічної точки зору, яку потрібно внести до регіональних та національних програм екосистемного менеджменту XXI ст.

*Ключові слова:* Карпати, сертифікація, спільний общинний менеджмент, лісова політика, лісові екосистеми, менеджмент природоохоронних територій, зменшення заготівель, сталий лісовий менеджмент, лісові продукти.

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Suggestions for training sessions in sustainable forest management CBD Programme of Work on forest biodiversity References Contents of the CD. ii. 1 3 5 7 9.Â  IUCN commends the Guide to its users in the belief that it helps communicate the value of Sustainable Forest Management as a reliable framework for safeguarding and delivering a broad range of goods and services, in a fair and equitable manner, to the widest possible range of stakeholders. Stewart Maginnis, Director â€“ Environment and Development International Union for Conservation of Nature.