ECONOMIC ANNALS-XXI
ISSN 1728-6239 (Online)
ISSN 1728-6220 (Print)
https://doi.org/10.21003/ea
http://ea21journal.world

Volume 192 Issue (7-8(2))'2021

Citation information:
Furdychko, O., Drebot, O., Palianychko, N., Dankevych, S., & Okabe, Y. (2021). Social aspect of forestry land use balance in Ukraine. Economic Annals-XXI, 192(7-8(2)), 88-107. doi: https://doi.org/10.21003/ea.V192-08

UDC 504:332:630.6

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Social aspect of forestry land use balance in Ukraine

Abstract. The purpose of the article is to identify the social component of forestry land use for decision-making at the national level to ensure the balanced use of forestlands both at the regional level and at the level of state forest enterprises. Theoretical and methodological bases of the research are based on the analysis of a set of social, economic and ecological indicators of reporting of forestry enterprises as indicators of the state of use of forest lands in the context of balanced development. Several aspects of the activity of the state forest enterprises in the period 2016-2020 by regions and climatic zones were studied in detail, and the scope of forest certification in Ukraine was assessed for a better ecological understanding of social processes in forestry in the country. A positive relationship with a significant correlation rate (r = 0.9078) is proved between the capital investments in forestry production and employment in the forest sector. In addition, fluctuations of the capital investments correlate with the staff qualification (r = 0.816). Assessment results for the level of technical provision of forestry enterprises point to the relationships between the level of technical provision and labour productivity (r = 0.7515) and the level of staff qualification (r = 0.7494). The strength of the relationship between labour productivity and labour remuneration varies over the regions of Ukraine with the correlation rate ranging between 0.7222 and 0.9852. We discuss key asymmetries, interactions and conflicts based on natural and regional specifics of forestry land use. Based on the results of the assessment of the relationships and dynamics

of selected indicators, the present study substantiates the necessity to take into account both national and stakeholders' interests in view of the social aspects of forestry land use with a focus on balance. Regional imbalance in income and labour productivity, insufficient training of employees, insufficient government funding and certification of forests, no practice of carbon units accounting at the regional and local levels, illegal felling are proven to be the restraining factors of the social balance of forestry land use. The results obtained in the study could help to identify potential levers of influence to ensure the balance of forestry land use and a better understanding of the social balance of forestry activities of enterprises.
Keywords: Forestry Lands; Social Indicators; Ecological and Economic Indicators; Balanced Land Use
JEL Classifications: Q23; Q24; O13; J21
Acknowledgements and Funding: The authors received no direct funding for this research.
Contribution: The authors contributed equally to this work.
Data Availability Statement: The dataset is publicly available from State Forest Resources Agency of Ukraine, Forest Stewardship Council, State Statistics Service of Ukraine, FAO and the reports of state forest enterprises.
DOI: https://doi.org/10.21003/ea.V192-08

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Соціальний аспект балансу лісогосподарського землекористування в Україні

Анотація. Мета дослідження – виокремити соціальну складову лісогосподарського землекористування задля прийняття рішень на національному рівні щодо забезпечення збалансованого використання лісових земель як в регіональному масштабі, так і на рівні держлісгоспів. Теоретичні та методологічні основи дослідження базуються на аналізі набору соціальних, економічних й екологічних показників звітності лісогосподарських підприємств як індикаторів стану використання земель лісогосподарського призначення в контексті збалансованого розвитку. З метою екологічного розуміння соціальних процесів у лісогосподарському землекористуванні України проведено детальне дослідження окремих аспектів діяльності державних лісогосподарських підприємств за 2016–2020 рр. у розрізі регіонів та за природно-кліматичними зонами, оцінено обсяги сертифікації лісів України. Ми обговорюємо ключові асиметрії, взаємовпливи та конфлікти на основі природних і регіональних особливостей лісогосподарського землекористування. Доведено позитивний взаємозв'язок між капітальними інвестиціями в лісогосподарське виробництво та зайнятістю в лісовому секторі зі значним коефіцієнтом кореляції r = 0,9078, також коливання капітальних інвестицій корелюють із кваліфікацією кадрів із коефіцієнтом r = 0,816. Результати оцінки рівня технічного забезпечення держлісгоспів вказують на взаємозв'язок із продуктивністю праці з коефіцієнтом кореляції r = 0,7515 та рівнем кваліфікації працівників із коефіцієнтом кореляції r = 0,7494. Сила взаємозв'язку продуктивності праці з рівнем оплати праці варіюється залежно від регіону України зі значенням коефіцієнта кореляції в діапазоні 0,7222–0,9852.
За результатами оцінки взаємозв'язків та змін окремих показників обґрунтовано необхідність урахування як національних інтересів, так і різноманітних інтересів зацікавлених сторін з огляду на соціальні аспекти використання лісових земель з орієнтацією на збалансованість. Доведено, що стримувальними факторами соціальної збалансованості лісогосподарського землекористування є регіональні дисбаланси в доходах працівників та в продуктивності праці, недостатнє підвищення кваліфікації працівників, недостатнє бюджетне фінансування, відсутність обліку вуглецевих одиниць на регіональному та місцевому рівнях, недостатні обсяги сертифікації лісів, незаконні рубки. Отримані результати допомагають виділити потенційні важелі впливу для забезпечення збалансованості лісогосподарського землекористування, а також кращого розуміння соціальної збалансованості лісогосподарської діяльності підприємств.
Ключові слова: ліс; соціальні показники; еколого-економічні показники; землі лісогосподарського призначення; збалансоване землекористування.

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Социальный аспект баланса лесохозяйственного землепользования в Украине

Аннотация. Цель статьи – выделить социальную составляющую лесохозяйственного землепользования для принятия решений на национальном уровне по обеспечению сбалансированного использования лесных земель как в региональном масштабе, так и на уровне гослесхозов. Теоретическое и методологическое основание исследования базируется на анализе набора социальных, экономических и экологических характеристик отчетности лесохозяйственных компаний как индикаторов состояния использования земель лесохозяйственного назначения в контексте сбалансированного развития. С целью экологического понимания социальных процессов в лесохозяйственном землепользовании Украины проведено детальное исследование отдельных аспектов деятельности государственных лесохозяйственных предприятий за 2016–2020 гг. в разрезе регионов и за природно-климатическими зонами, оценены объемы сертификации лесов Украины. Мы обсуждаем ключевые асимметрии, взаимовлияния и конфликты на основе природных и региональных особенностей лесохозяйственного землепользования. Доказана положительная взаимосвязь между капитальными инвестициями в лесохозяйственное производство и занятостью в лесном секторе со значительным коэффициентом корреляции r = 0,9078, а также колебания капитальных инвестиций коррелируют с квалификацией кадров с коэффициентом r = 0,816. Результаты оценки уровня технического обеспечения гослесхозов указывают на взаимосвязь с производительностью труда с коэффициентом корреляции r = 0,7515 и уровнем квалификации работников с коэффициентом корреляции r = 0,7494. Сила взаимосвязи производительности труда с уровнем оплаты труда варьируется в зависимости от региона со значением коэффициента корреляции в диапазоне 0,7222–0,9852. По результатам оценки взаимосвязей и изменений отдельных показателей обоснована необходимость учета как национальных интересов, так и различных интересов заинтересованных сторон, учитывая социальные аспекты использования лесных земель с ориентацией на сбалансированность. Доказано, что сдерживающими факторами социальной сбалансированности лесохозяйственного землепользования являются региональные дисбалансы в доходах работников и производительности труда, недостаточное повышение квалификации работников, недостаточное бюджетное финансирование, отсутствие учета углеродных единиц на региональном и местном уровнях, недостаточные объемы сертификации лесов, незаконные рубки. Полученные результаты помогают выделить потенциальные рычаги влияния на обеспечение сбалансированности лесохозяйственного землепользования, лучшего понимания социальной сбалансированности лесохозяйственной деятельности предприятий.

Ключевые слова: лес; социальные показатели; эколого-экономические показатели; земли лесохозяйственного назначения; сбалансированное землепользование.

1. Introduction

The main idea of this paper is to identify the social component of forestry land use for decision-making at the national level to ensure the balanced use of forestlands both at the regional level and at the level of state forest enterprises. Forests are of great global interest, as much of the world's biodiversity relies on forest ecosystems that provide a wide range of ecosystem services to human society (Eyvindson et al., 2021). Socio-economic drivers put pressure on the environment, thereby affecting the ability of forests to provide ecosystem services (Vigna et al., 2021). The cumulative effects of the long-term landscape transformation and land use intensification coincided in space and time, representing a potential «sledge-hammer effect», when ecosystems and landscapes fall into irreversible states from which they cannot return to their previous states (Svensson et al., 2021). The social aspect should be considered as an important component of the balanced forestry land use

in the country. Awareness of this importance should be reflected in the numerous processes that could lead to the preservation and enrichment of forestry resources for the benefit of society as a whole (Bartniczak and Raszkowski, 2018). The extremely important role of forests for the ecological, economic, and social stability of Ukraine necessitates the balanced use of forest lands, which emphasizes the integrity of economic, social, and environmental goals (Piwowar-Sulej, 2021). The novelty of this study is a comprehensive empirical analysis of restraining factors of the social balance of forestry land use. The approach of the empirical analysis is based on the assessment of the variability of the social component of forestry land use in Ukraine from the standpoint of regional balance. To achieve a goal of this study the following research tasks are supposed to be solved: to analyze the set of social indicators of reporting of forestry enterprises as indicators of the state of forest use, to find out the causal relationships between individual indicators that characterize the course of certain social, economic and ecological processes in forestry. We examined many indicators which we considered appropriate and effective for assessing the social aspect of the balance of forestry land use. The study is based on the official data of Global Forest Assessment by FAO 2020, the State Forest Resources Agency of Ukraine, the Forest Stewardship Council®, the State Statistics Service of Ukraine, and the reports of state forest enterprises.

2. Brief Literature Review

According to Podlevska and Krasovska (2017), the concept of balanced development requires consideration of geographical (spatial) factor in various processes: economic development should be associated with a specific area, environmental standards should be provided not in general, but also for a specific area, social equality should be ensured in a particular community, but not abstractly in national average indices. Such an approach is one of the tools to avoid significant imbalances of socio-economic development over the regions. According to Lesiuk (2017), «Social forestry is the management of forestry, aimed primarily at ensuring the well-being of local population who depend on forest resources, taking into account the social consequences of the forest resources use for various stakeholders.» There are many ongoing projects and initiatives, such as revising social criteria and the transition to a circular economy, aimed at enhancing positive effects, mitigating the negative ones, and avoiding the negative consequences passing to future generations (Schweier et al., 2019).

Karvonen et al. (2017) noted that the social dimension is perhaps the least common. Karvonen et al. (2017) give an example that income can hardly be compared globally, given that a salary increase of one euro per week has a different impact depending on the size of the salary (yearly average euro rate (National Bank of Ukraine, 2021) for 2016 was 28.29 UAH, 2017 - 30.00 UAH, 2018 - 32.14 UAH, 2019 - 28.95 UAH, 2020 - 30.79 UAH). Poverty, malnutrition, inequality, and other social problems are reaching extreme levels in developing countries; meanwhile, such social problems seem rather insignificant in developed countries. However, a multidimensional approach is important for the comprehensive assessment of sustainability. For example, if we expect an increase in the gross domestic product (economic aspect), then we can expect an impact on welfare (social aspect) and the use of natural resources (environmental aspect). For the assessment, it is essential to clearly define the boundaries of the system, select appropriate indicators and describe them in order to measure and determine their impact. Some indicators can be considered in several categories, for example, the risk of negative profits fits not only into the economic but also social category. From the point of view of management, the main problems include the assessment of social indicators and their impact (Schweier et al., 2019). Social indicators can be further subdivided into subcategories (e.g. working conditions), which can be measured by indicators (e.g. excessive working hours) (Karvonen et al., 2017).

Tretiak et al. (2020) identified strengths and weaknesses, opportunities, and threats to social factors in the field of forest resources. The strengths include developed mechanisms for the use of forest resources by citizens, significant public influence on forest management processes at the local level, favourable conditions for access of local communities to forest resources, tourist activities, and cattle grazing near forest areas. The weaknesses of social factors are the attitude of consumers to forests in Ukraine, a significant influence of informal institutions on the processes of resource use, irrational utilization of resources by the population, one of the reasons for which is weak and ineffective penalties and limited by the local social elite access to forests for the local population. The opportunities of social factors in the field of forest resource use are strengthening public control over forest resources, implementation of special educational programs on forest conservation, maintenance of the

forest useful functions and protection of biodiversity, increasing the transparency of the forest sector, and raising public awareness. The threats include low environmental and legal culture of the citizens; violation of laws and regulations on labour protection and industrial safety, low level of implementation of European regulation in the field of forest resources use in local communities (Tretiak et al., 2020).

Gutiérrez Rodríguez et al., (2016) attribute the income of workers, employment, food security, access to land, social equality, and migration to the category of social consequences of forestry land use. According to Abedi and Abedi (2020), social benefits of forest sustainability include improved air quality, physical and visual access to nature. However, the effects of income are greatly variable, both over time and on different geographical scales. Social sustainability is most important when it is assessed at the regional or national level. The social dimension includes five main categories of stakeholders: employees, local communities, society (national and global), consumers, and value chain actors (Gutiérrez Rodríguez et al., 2016).

Despite the improvements shown by the main statistical indicators of forests in Ukraine (Zamula et al., 2020), there are many significant problems in forest management. Ukraine is characterized by deep imbalances in regional economic interests, the discrepancy between the locations of natural resources and socio-economic potential (Podlevska and Krasovska, 2017). In Ukraine, there are social aspects of imbalances in forestry land use, e.g. significant gaps in salaries over regions. In turn, the growth of territorial disparities in the level and quality of life of the population enhances external and internal migration that is virtually uncontrolled and leads to an outflow of labour (The Cabinet of Ministers of Ukraine, 2020). The asymmetry of the social component determines the relevance of the present study, which goal is to assess the social aspects of balanced use of forestlands. The study presents a scientific background for achieving the goals of state environmental policy adopted by the Parliament of Ukraine (Verkhovna Rada of Ukraine, 2019) and provides a broad socio-environmental perspective to ensure the balance of forestry land use. In order to implement balanced management of forestry activities, it is essential to find the necessary levers for changing the system to ensure the balanced use of forestry land. This approach requires the study of certain indicators in the dynamics, their response to the influence of external and internal factors, as well as consideration of feedback (Luvuno et al., 2018).

3. Research Methodology

The following methods were used in the study: dialectical method of cognition for the analysis of scientific studies on the problems of balanced forestry land use; method of analogies (transfer of patterns of development of one process with certain amendments to another process or territory); statistical method (based on quantitative indicators that allow drawing conclusions about the rate of development of the process); correlation analysis (identification of factors that significantly affect the forecast; clarification of relationships, their correlations with the predicted phenomenon under the influence of certain factors), graphical method, abstract-logical (theoretical generalization and drawing conclusions).

In Ukraine, almost 73% of forestland is managed by state forest enterprises that are subordinated to the State Agency of Forest Resources of Ukraine. Based on the annual reports of the State Agency of Forest Resources of Ukraine and the reports of 288 state forestry enterprises, the indicators were consolidated on the territorial basis (territorial bodies of the State Agency of Forest Resources of Ukraine - 24 regional departments of forestry and hunting) and grouped on the climate basis (climatic zones of Ukraine - Polissia, Forest-Steppe, Steppe, the Carpathians. This study is based on an analysis of the social aspect of balancing forestry activities and assumes that state forest managers at the local level make well-informed decisions about the economic, environmental, and social consequences of the economic activities on forest lands. Social factors have been studied with a focus on the ability to understand impacts, their relationships, and their scale. The research periods of the study were determined by the availability of data. Indicators of carbon stock are available in the Global Forest Resources Assessment section of the FAO website for 1990, 2000, 2010, 2015, and 2020 years. For the period 2016-2020, the dynamics of the provision of state forest enterprises with labour resources, labour productivity, average monthly salaries, government funding, and illegal felling was studied. For the period 2018-2020, the relationship between capital investment in forestry production and the number of employees in state forest enterprises was studied (in this period there was a significant decrease in labour supply). For the period 2017-2020, changes in the relative amount of professional training of forestry specialists were studied. The current state of forest certification in Ukraine is estimated as of 10 May 2021.

4. Results and Discussion

Social drivers include quantitative physical factors, e.g. population growth and wood harvesting, as well as complex traits that are difficult to quantify, such as governance and outlook on life. The latter tend to influence both social drivers and socially conditioned environmental factors through legislation and value systems, which in turn affect land use and institutional governance mechanisms. The Strategy of the State Environmental Policy of Ukraine until 2030 (2019) envisages the introduction of balanced forest management, achieving significant progress in improving the state of the environment by balancing socio-economic needs and objectives in the field of environmental protection, ensuring the development of environmentally efficient partnerships between the state and the public. Intergovernmental Panel on Climate Change (IPCC) attributes to social effects also balanced management of forest resources, expansion of cultural living environments, recreation areas, and improvement of people's health (State Forestry Agency, 2021). Listed in the Order of the Ministry of Energy and Environmental Protection of Ukraine (2020) social factors in the field of forestry are the following: data on employment of the local population; data on tourist infrastructure; marked tourist, recreational, and educational routes; recreational areas identified in forest management; other places of tourist, scientific, educational or aesthetic value; places of non-commercial use of forest resources by the local population (fishing, collection of plants, berries, fruits, mushrooms, etc.); places of the special use of natural resources within the forestry in the form of harvesting of secondary forest materials, secondary forest uses and use of useful properties of forests.

Currently, the responsible state bodies of Ukraine in the field of forestry are the Ministry of Environmental Protection and Natural Resources of Ukraine (Ministry of Environment), the State Forest Resources Agency of Ukraine (State Forest Agency), State Enterprise Forestry Innovation and Analytical Centre (FIAC), and regional forestry and hunting departments (RFHD). Given in Table 1 are their competencies. In Ukraine, state forests are assigned to enterprises, institutions, and organizations under the jurisdiction of several dozen ministries and departments. However, about 73% of forestlands are under departmental subordination in the use of state forestry enterprises (state forest enterprises), which are coordinated by the State Forestry Agency. The main activities of state forest enterprises include forestry, protection and rational use and reproduction of forest ecosystems, wood harvesting and sale, wood processing, secondary use of forests.

We studied the reporting indicators of 288 state forest enterprises subordinated to the State Forestry Agency, consolidated in 24 territorial bodies (RFHD) for the period 2016-2020. The economic activity of state forest enterprises is regulated by RFHD and the State Forestry Agency. The distribution of forestlands among state forest enterprises by natural and climatic zones is largely uneven. The largest share of state forest enterprises (28.5%) is located in the natural-climatic zone of the Forest-Steppe; meanwhile, the largest share of forestlands (34.3%) of State Forest Agency is located in the natural and climatic zone of Polissia (Table 2).

State forest enterprises fill local budgets, provide jobs for the rural population, provide social protection to their employees, and help in a number of other social issues. The socio-economic development of local territorial communities also depends on the activity of state forest enterprises. In particular,

Table 1:
Responsible state bodies in the field of forestry in Ukraine and their competencies

Responsible authorities	Competencies, tasks
Ministry of Environment	Ensures the formation and implementation of state policy in the field of environmental protection, environmental, biological, and genetic safety, fishery, forestry, and hunting
State Forest Agency	The main tasks are implementation of state policy in the field of forestry and hunting; submission to the Minister of Environmental Protection and Natural Resources of proposals to ensure the formation of state policy in the field of forestry and hunting. Takes measures to ensure the implementation of social policy in the field of forestry and hunting
RFHD	Subordinated to the State Forestry Agency and are its territorial bodies. The task of the Departments is to implement the powers of the State Forest Agency on the territory of the relevant administrative-territorial unit in the field of forestry and hunting.
FIAC	Coordinates and controls the work related to the development, maintenance, and operation of the electronic wood circulation system. Determines the organizational and methodological principles of its operation and develops (in coordination with the State Forestry Agency) the rules for using the system. Ensures the accumulation, processing, formatting, and systematization of information flows. Implements the application for digitalization of the industry «Forest in a Smartphone» for the control of the origin of wood materials. Holds auctions.

Source: Composed by the authors

Table 2:
Location of state forest enterprises of the State Forestry Agency of Ukraine by natural and climatic regions

Index	Natural and climatic zones of Ukraine			
	Polissia	Forest-Steppe	Steppe	The Carpathians
The number of RFHD	4	8	8	4
Number of economically active forest enterprises	75	82	62	69
The share of state forest enterprises in their total number,%	26.0	28.5	21.5	24.0
The total area of forest lands of state forest enterprises, 1000 hectares	2529.4	2038.1	1075.7	1715.2
The share of forest lands state forest enterprises,%	34.3	27.7	14.6	23.4
Estimated area of forest lands on average per 1 state forestry, 1000 hectares	33.7	24.9	17.4	24.9

Source: Formed by the authors according to the reports of the State Forest Agency

the socio-economic services of state-owned forests for local communities include non-timber forest products, cattle grazing, firewood, etc. For example, forestry enterprises play an important social role in providing fuel to rural schools, clinics, and low-income families (Oborska et al., 2017).

In the social sector, human capital should be considered the most valuable resource (Bartniczak and Raszkowski, 2018). The efficiency of forest management in the social dimension is characterized by personnel policy since labour resources are the main production resource. In the research of Gutiérrez Rodríguez et al. (2016), employment is considered a social indicator, on which the forest sector has a strong impact. Employment has many important functions for well-being, as it generates income. Income, in turn, provides access to many functions of social well-being. In addition, the increase in income leads to an increase in budget funds due to taxation (national economy). Jobs creation includes direct, indirect, and induced job creation. Therefore, the exact total number of jobs created is difficult to estimate (Karvonen, et al., 2017). This was also confirmed in the study of Gutiérrez Rodríguez et al. (2016). We studied the dynamics of the provision of state forest enterprises with labour resources in the period 2016-2020, taking into account the regional context (Figure 1). The relative number of employees of state forest enterprises per 1000 hectares of forest land is uneven over the natural and climatic zones of Ukraine: the largest number is in the Carpathian zone (decreased by 10.2% during the study period) and the smallest in the Steppe zone (decreased by 7.8%). Although in the Polissia zone, the largest share of forest lands of state forest enterprises is concentrated, this zone ranks third in terms of staffing and leads in decreasing the number of employees by 17.2%.The number of employees required largely depends on the technology and practice (Gutiérrez Rodríguez et al., 2016).

We found a connection between the capital investments of state forest enterprises in forestry production and the number of employees in the period 2018–2020, which is characterized by a significant decrease in staffing (Figure 2). The assessment confirms the close direct relationship between the studied indicators at a significant correlation coefficient $r = 0.9078$. Consequently, the volume of capital investments of state forest enterprises by 78.5% affected the growth of the number of experts in the forest sector. On the one hand, investments promote economic development, implementation of new technologies, and equipment upgrades. On the other hand, they require the availability of highly qualified staff.

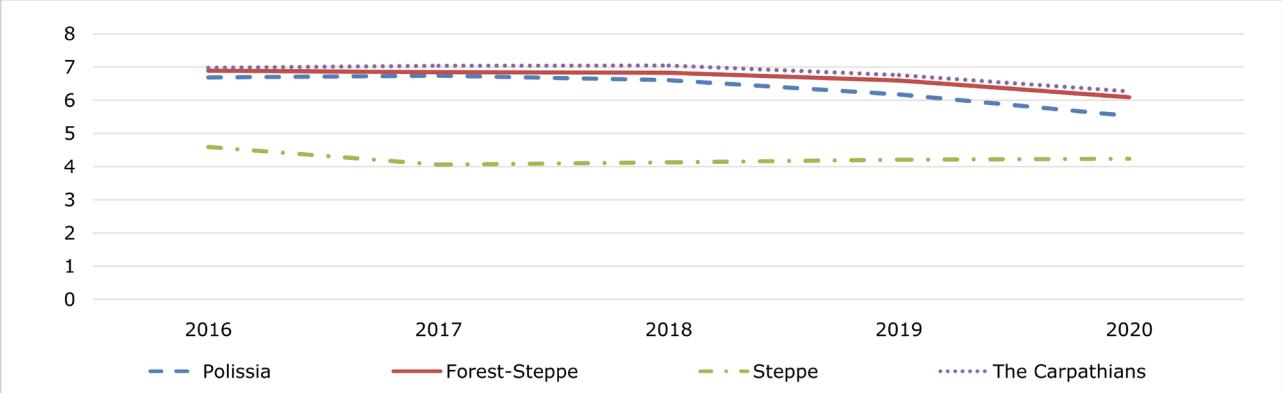


Figure 1:
Staffing of state forest enterprises in Ukraine (persons per 1000 hectares) in the period 2016-2020
Source: Composed by the authors according to the reports of the State Forest Agency

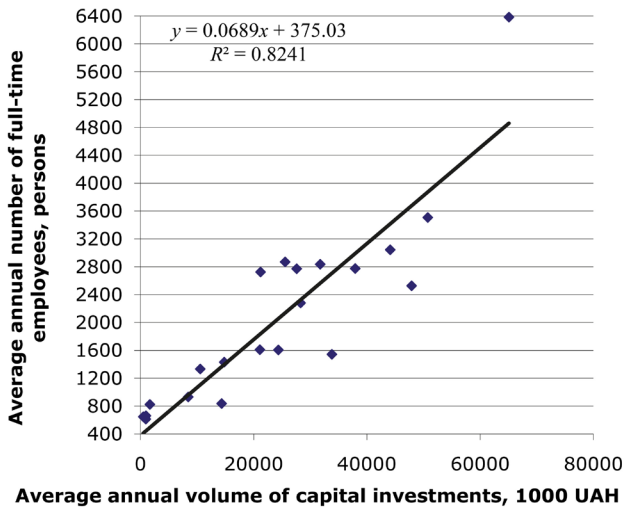


Figure 2:
Correlation field and correlation dependence of the number of full-time employees on capital investments in state forest enterprises in the period 2018-2020
Source: Composed by the authors according to the reports of the State Forest Agency

Effective environmental education is an important determinant of sustainable forest management (Bartniczak and Raszkowski, 2018). Although in Ukraine, in general, the supply of forest specialists significantly exceeds the number of real jobs in forestry enterprises, however, in the South and East of the country there is a shortage of specialists (Ministry of Energy and Environment Protection of Ukraine., 2020). At the same time, improving environmental education is important for the conservation of natural resources, including forestry (Bartniczak and Raszkowski, 2018). We studied the dynamics of staff training of forest sector workers for the period 2017-2020 (Figure 3). The highest share of state forestry employees who participated in advanced staff training was in the Forest-Steppe zone (3.9% in 2019), while the lowest was in the Steppe zone (1% in 2017). In the Polissia zone, where the share of forestlands of state forest enterprises is the highest (Table 2), managers pay almost no attention to staff training (2.5-2.9%). Growth of the staff-training rate in state forestry was observed from 2017 to 2019. However, since 2020, this indicator decreased significantly in all zones. Noteworthy that at the same time, in 2020, during the quarantine period established to prevent the spread of COVID-19 caused by the coronavirus SARS-CoV-2 in Ukraine, staff training was carried out mainly online (State Forestry Agency, 2021). Thus, the average annual percentage of staff training for forest workers in the period 2017-2020 did not exceed even 3%. Such results may be explained by the imperfect personnel policy of forestry enterprises. In such a scenario, the socio-economic balance of forestry land use will be slowed down.

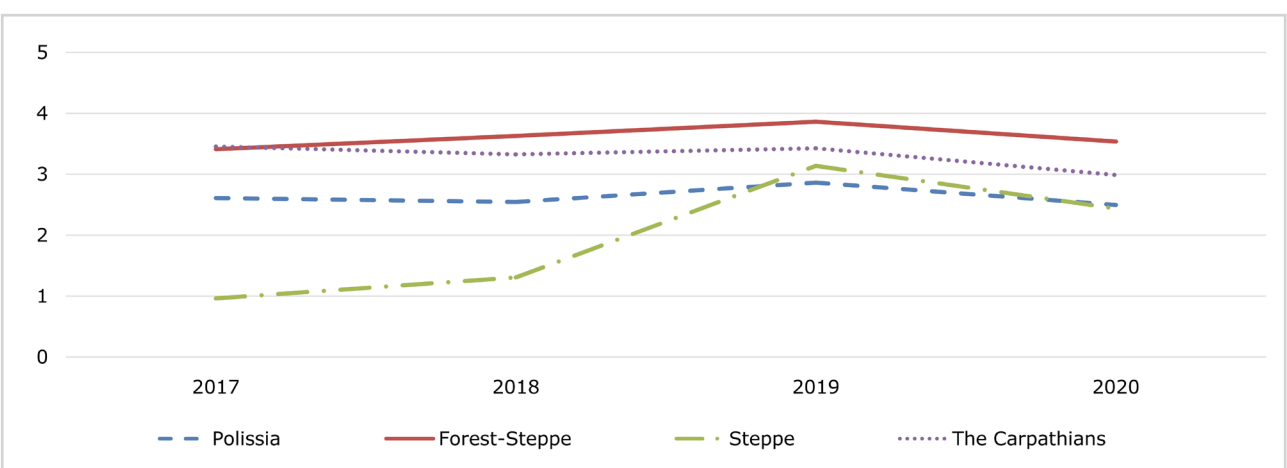


Figure 3:
Dynamics of staff training in the forest sector in the period 2017-2020
Source: Composed by the authors according to the reports of the State Forest Agency

We investigated the impact of growth capital investment in forestry production on the availability of highly qualified personnel indirectly, through staff training, on average for the period 2018-2020, when there was a significant decrease in labour supply (Figure 4). The assessment confirms the close direct relationship between the studied indicators with a significant correlation coefficient $r = 0.816$. The formation of the personnel policy of state forest enterprises by 66.6% depends on investments for the purchase of advanced forestry machinery, equipment and the introduction of environmental technologies, which requires the introduction of a state program to support relevant investments. Thus, economic incentives to increase investment activity will increase the social sustainability of forest land use.

Dynamics of labour productivity for the period 2016-2020, taking into account the influence of regional specifics is shown in Figure 5.

In general, labour productivity, in terms of cost, was the highest in the Forest-Steppe region (as already mentioned, this is the region with the highest share of staff training) and the lowest in the Steppe region. A significant increase in the productivity of state forest enterprises occurred in 2017 and 2018. However, in 2019, this indicator decreased significantly. In 2020, compared to 2019, the growth of labour productivity was observed in the Polissia zone - by 8.6%, in the Forest-Steppe zone - by only 2.5%. At the same time, in the Steppe and Carpathian zone, there was a decrease of

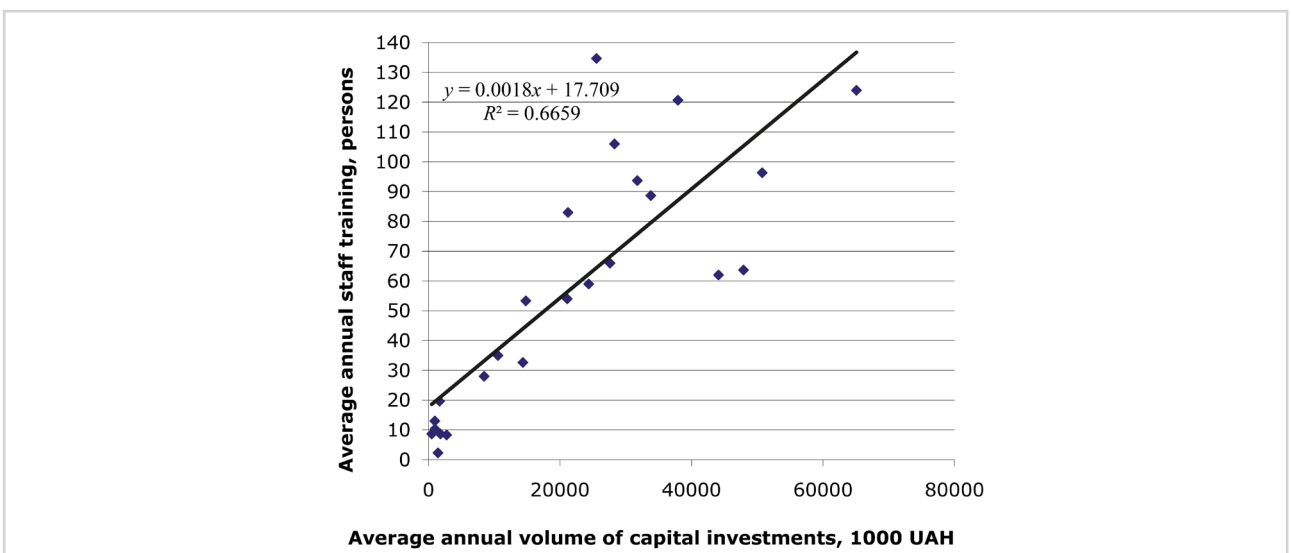


Figure 4:
The influence of capital investment in forestry production on availability of highly qualified personnel in the period 2018-2020
Source: Composed by the authors according to the reports of the State Forest Agency

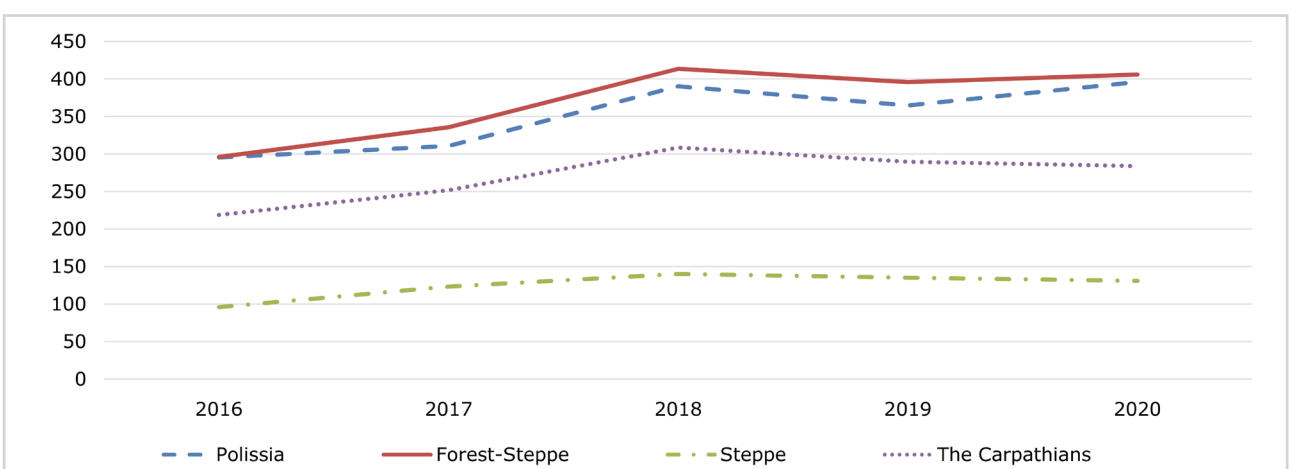


Figure 5:
Dynamics of labour productivity in state forest enterprises of the State Forest Agency in the period 2016-2020
Source: Composed by the authors according to the reports of the State Forest Agency

3.2% and 1.9%, respectively. However, the growth rate of labour productivity is a part of the overall inflation process, as the aggregate inflation index for the study period was 153.2%.

We investigated the lowest and highest levels of labour productivity in individual enterprises of the State Forestry Agency for the period 2016-2020 (Table 3). The upper limit of labour productivity in state forest enterprises for the studied period exceeded the lower limit in 2016 by 537 times, in 2017 by 37 times, in 2018 by 384 times, in 2019 by 30 times, and in 2020 by 75 times.

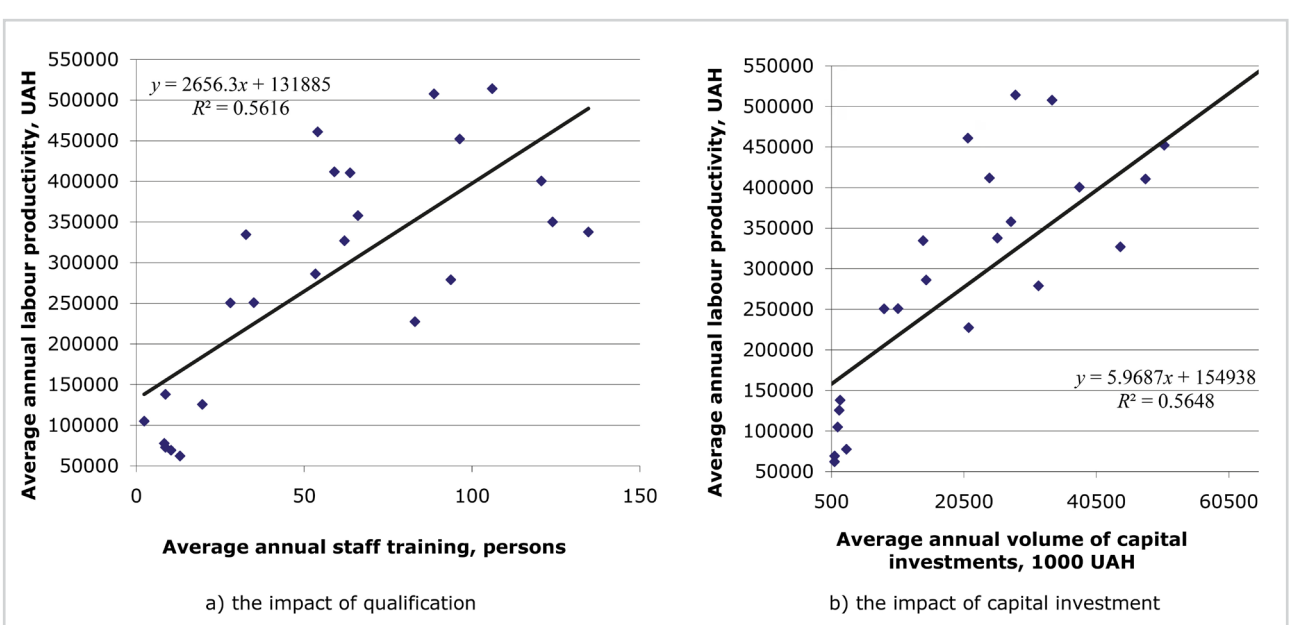
Shown in Figure 6 is the influence of several factors on labour productivity, on average for the period 2018-2020 (as we already noted, in this period, labour supply dropped). The results of the assessment of the relationship confirm the direct equal impact of both the level of qualification of workers and the level of technical re-equipment of the forest industry on labour productivity with r values of 0.7494 and 0.7515, respectively.

According to Biryuchenko (2019), the main purpose of the formation of the personnel income at an enterprise is to ensure the efficiency of economic activity. The key to the successful implementation of balanced development of state forest enterprises is motivated employees. Although income distribution may not be a sufficient index, it is still the best measurable characteristic of equity, in order to be linked, for example, to better environmental, health, and educational results and a strong overall social base (Karvonen et al., 2017). That is salary may be considered as an appropriate indicator. The average monthly salary in state forest enterprises in the period 2016-2020 grew at a much faster rate than the productivity of forestry activities and was uneven over the studied regions of Ukraine. An individual's income level as opposed to the general income level may be better for describing well-being (Karvonen et al., 2017). The highest level of average monthly salary in state forest enterprises for the period 2016-2020 was in the Forest-Steppe zone (an increase of 57.4%), in the Polissia zone (45.3%), and in the Carpathian zone (51.6%), while the lowest was in the Steppe zone, although the growth during the study period occurred twice

Table 3:
Range of labour productivity levels in the state forest enterprises of the State Forest Agency for the period 2016-2020

Year	State Forest enterprises, 1000 UAH		On average for the State Forest Agency, 1000 UAH	Relative to the average,%	
	the lowest level	the highest level		the lowest level	the highest level
2016	4.1	2205.1	247.2	1.7	892
2017	76.4	2805.7	277.4	27.5	1011.4
2018	6.3	3412.7	349.5	1.8	976.5
2019	94.6	2853.5	329.1	28.7	867.1
2020	38.1	2873.5	339.0	11.2	847.6

Source: Formed by the authors according to the reports of the State Forest Agency



a) the impact of qualification

b) the impact of capital investment

Figure 6:
Impact of selected factors on labour productivity, the average for the period 2018-2020
Source: Composed by the authors according to the reports of the State Forest Agency

(Figure 7). Salary growth rates in forest-resource regions were 4 times lower than the average in Ukraine, where the average monthly salary for the studied period increased 2.2 times.

In the period 2016-2018, the average monthly salary in the state forest enterprises of the Steppe region was lower than the average in Ukraine. Poverty alleviation is a multidimensional variable measured by several interrelated characteristics, including income, employment, and social equality (Gutiérrez Rodríguez et al., 2016). Noteworthy that the average monthly salary in the Steppe zone in the years 2016-2018 was also lower than the subsistence level (State Forestry Agency, 2021). Starting from 2019, also in the Carpathian and Polissia zones, the average monthly salary was lower than the average in Ukraine (Figure 7). Although the internal mechanism of accumulation and redistribution of funds in the system of enterprises of the State Forest Agency was not developed, to stabilize the situation in the Steppe zone in the absence of funding from the State budget, state forest enterprises of resource regions provided financial assistance to the state forest enterprises of the Steppe zone. The volume of the assistance amounted for 4 million UAH in 2016, 90.4 million UAH in 2017, and almost 136 million UAH in 2018. Thanks to that financial assistance, salary back pays in the Steppe were avoided. Since 2019, the funds of the special fund of the State Budget are directed to enterprises of the non-resource regions of the country: 256.5 million UAH was directed in 2019 and 254.2 million UAH in 2020. We studied the volumes of additional financing of state forest enterprises by RFHD for the period 2016-2020 (Table 4).

The highest level of funding from the special fund of the state budget per 1 ha of forest lands obtained those state forest enterprises of the Steppe zone that did not carry out felling for the primary use. We studied the impact of the social aspect on the volume of financial assistance in the period 2016-2018 and the impact on the amount of government funding in the period 2019-2020 (Figure 8). Thus, 44.43% of financial assistance to state forest enterprises of the Steppe zone in 2016-2018 was formed with inverse dependence under the influence of the average monthly salary of employees (r = 0.6666). In 2019-2020, only 20.04% of government funding was formed with inverse dependence under the influence of the average monthly salary of employees (r = 0.4477).

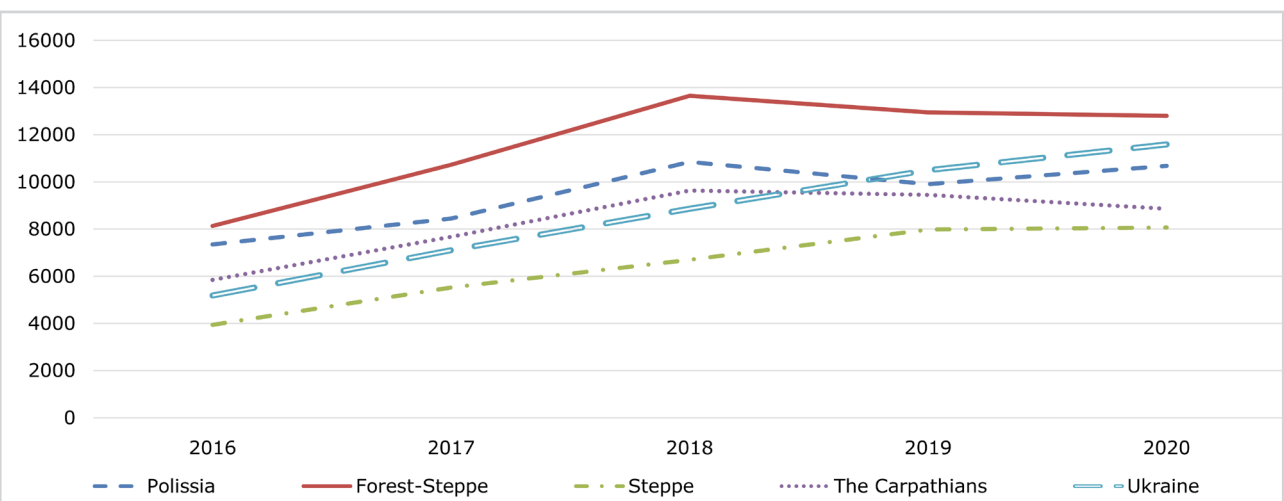


Figure 7:
Dynamics of average monthly salary in state forest enterprises of the State Forest Agency in the period 2016-2020
Source: Composed by the authors according to the reports of the State Forest Agency

Table 4:
Relative volumes of financing of state forest enterprises of the Steppe zone in the period 2016-2020 (UAH per 1 ha)

RFHD	2016	2017	2018	2019	2020
	Financial assistance			From the special fund of the state budget	
Dnipro	48	139	223	405	332
Donetsk	26	36	47	180	221
Zaporizhzhia	38	150	214	260	248
Kropyvnytskyi	10	5	8	47	48
Luhansk	18	49	47	37	67
Mykolaiv	43	129	186	320	403
Odesa	23	52	134	208	178
Kherson	40	141	202	277	319

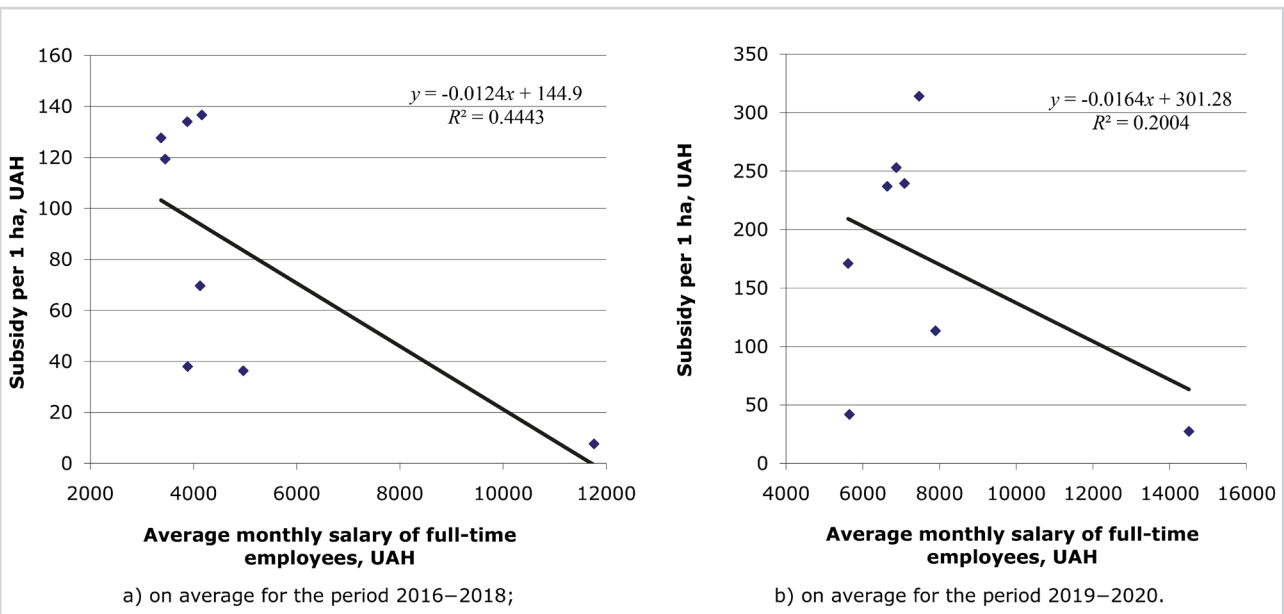
Source: Composed by the authors according to the reports of the State Forest Agency

This may be explained by the fact that government subsidies are directed to measures for the protection and preservation of forests by enterprises of non-resource regions.

To determine social efficiency, it is important to compare the indicators characterizing the social result in conditions of economic imbalance at the local and regional levels (Zamula et al., 2020). We studied the range of average monthly salary in state forest enterprises of the State Forest Agency for the period 2016-2020 (Table 5).

The difference between the upper and lower levels of the average monthly salary in state forest enterprises for the studied period was quite significant: from 500% to 930%. Compared to the average monthly salary in Ukraine in some state forest enterprises, these values were 2-2.6 times lower. Socially oriented forestry contributes to the well-being of the local population and society as a whole, as well as encourages the local population to conserve forest resources. State Forestry Agency (2021) and the Ministry of Environment (2021) consider the low level of socio-economic development of the regions (high level of unemployment among the population that harvests firewood to meet vital needs, low salaries, etc.) as the main factors leading to illegal felling. The average annual volumes of illegal felling in terms of administrative regions of Ukraine for the period 2016-2020 are shown in Figure 9.

The largest volumes of illegal felling in the Steppe zone are observed in the Kherson region. Employees of state forest enterprises located in the Kherson region had the lowest level of average monthly salary (Table 5). The analysis points to the significant potential for conflicts at the regional level between forestry activities and the social aspect of forestry land use. In the Forest-Steppe zone, the largest volumes of illegal felling are observed in the Kharkiv region. It should be noted that the forest area of the Kharkiv region ranks 10th among the administrative regions of Ukraine; however, there are no certified forests at all. According to Debkov (2019), forest certification will strengthen not only the ecological but also the social functions of forests. The purpose of forest certification is to ensure economically, environmentally, and socially balanced



a) on average for the period 2016–2018; b) on average for the period 2019–2020.

Figure 8:
Impact of the social aspect on a volume of subsidies in the period 2016-2018 and on the amount of government funding in the period 2019-2020 in the Steppe zone
Source: Composed by the authors according to the reports of the State Forest Agency

Table 5:
The range of average monthly salaries in state forest enterprises of Ukraine for the period 2016-2020

Period	State Forestry		On average in Ukraine, UAH (USD)	Deviation from the average in Ukraine,%	
	the lowest, UAH (USD)	the highest, UAH (USD)		the lowest	the highest
2016	1975 (77)	9910 (387)	5183 (202)	38.1	191.2
2017	3139 (117)	24820 (933)	7104 (267)	44.2	349.4
2018	3472 (128)	32274 (1187)	8865 (326)	39.2	364.1
2019	5408 (210)	33015 (1280)	10497 (407)	51.5	314.5
2020	4983 (185)	32944 (1221)	11591 (430)	43.0	284.2

Source: Composed by the authors according to the reports of the State Forest Agency (2021)

forest management by complying with relevant generally accepted and credible standards (State Forestry Agency, 2021). FSC national standard of forestry system (The Forest Stewardship, 2020) contains requirements for the social component of the forestry management system (Table 6).

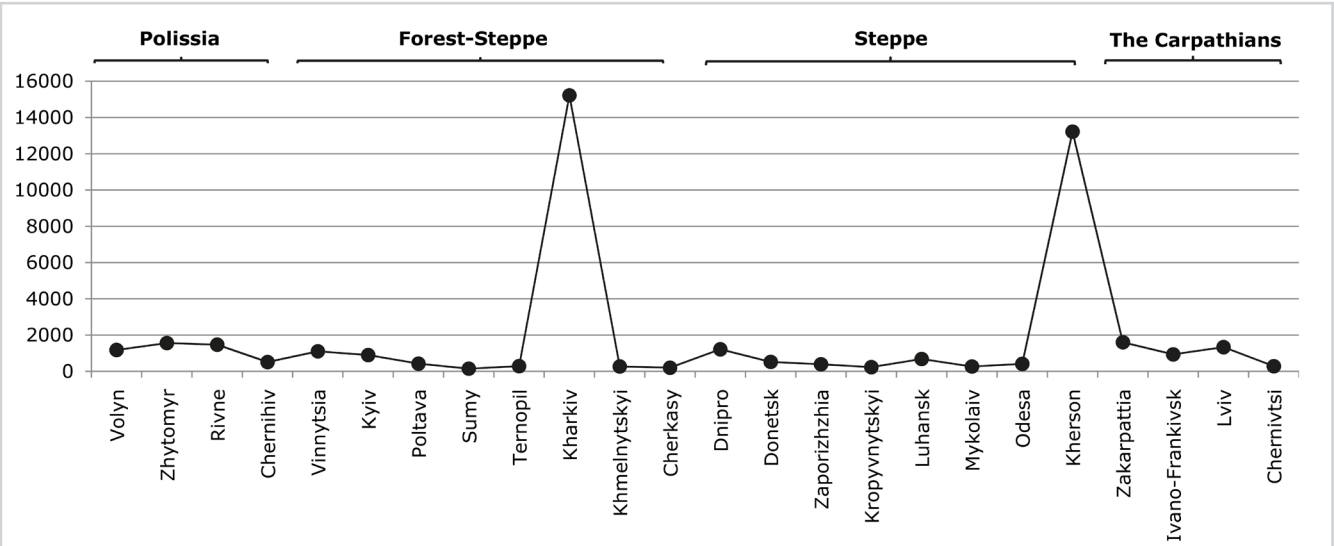


Figure 9:
The volume of illegal felling (m^3), on average for the period 2016-2020
Source: Composed by the author according to the reports of the State Forestry Resources Agency of Ukraine

Table 6:
Excerpt from the principles and criteria of the FSC on the social component of the forestry system for Ukraine

Principles of FSC forest certification	Criteria
Maintaining or enhancing the socio-economic well-being of employees	- fulfilment principles and rights to work by an enterprise; - promoting gender equality in the rights and opportunities of employees in the enterprise; - ensuring the hygiene and safety of workers to protect them from health threats; - ensuring proper remuneration of employees, taking into account the obligations of enterprises defined by the law; - availability of proper professional training of employees.
Maintaining or enhancing the socio-economic well-being of local communities	- recognition and maintenance of legal rights of local communities; - implementation of projects and additional activities to promote socio-economic development of local communities; - application of measures to identify, avoid and mitigate significant negative social, environmental and economic impacts of economic activities on communities; - availability of mechanisms for reviewing complaints and providing fair compensation to local communities in certain cases, which is associated with the impact of economic activity of the enterprise; - identification of places of special cultural, ecological significance to which local communities would have legal rights, and taking this into account in the process of management.
Efficient management, taking into account a variety of forest products and services, to maintain or increase economic viability and obtain social and environmental benefits	- promotion of diversification of the local economy by the enterprise through the development of production and processing of various products based on different types of resources, creating added value at the local level.
The necessity to form an enterprise management plan taking into account the scale, intensity, and risks of its economic activity, as well as the implementation of the plan and its update based on monitoring results to promote adaptive management	- availability and implementation of a management plan consistent with the objectives of environmentally sound, socially useful, and economically viable management; - periodic review and consideration of updates in the management plan following the results of monitoring and other information to ensure compliance with changes in environmental, social, and economic conditions; - ensuring the openness of the processes of planning and monitoring of the economic activity by involving stakeholders, as well as by ensuring the availability of the summary of the management plan to the public.
The importance of monitoring and assessment of the enterprise's achievement of management objectives, the impact of economic activity and the state of the enterprise in accordance with the scale, intensity, and risk in order to conduct adaptive management.	- monitoring the implementation of the management plan, progress in the implementation of planned activities, monitoring and evaluation of its environmental and social impacts; - ensuring the availability of the summary of the monitoring results to the public.

Source: Composed by the authors on the basis of The FSC National Forest Stewardship Standard of Ukraine National Standard (2020)

Thus, the implementation of the FSC national standard is aimed at balancing not only the economic and environmental interests regarding forests, but also takes into account the social component of the planning, implementation, monitoring and evaluation, as well as adjustments for continuous improvement to achieve certain goals. Consequently, the social balance of forestry activities is guaranteed on forest lands with certified forests. An indicator of the assessment of the forestry land use balance is the share of certified forests in the total forest area. As of 10 May 2021, only 42% of the country's forest areas (4.44 million hectares) have been certified. The current state of forest certification differs over natural and climatic zones. To illustrate, in the Polissia zone 58% (1.9 million hectares) of forest areas are certified, in the Carpathian zone 61% (1.4 million hectares), in Forest-Steppe 32% (1.0 million hectares), and in Steppe 5% (0.1 million hectares) (Figure 10).

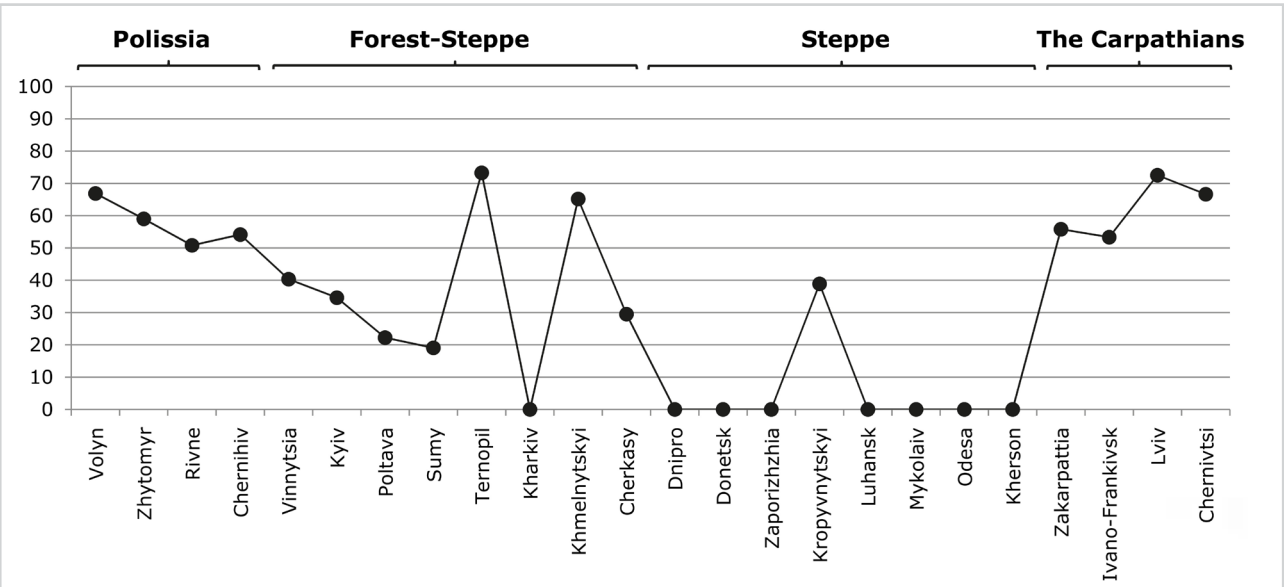


Figure 10:
The share of certified forests in Ukraine (%) as of 10.05.2021
Source: Composed by authors based on the Forest Stewardship Council® data

In 2019, a program of the Ukrainian Government activities was approved. One of the program's tasks is to increase the certification of forests following the requirements of the FSC. Although there is a positive dynamics of growth in forest certification by 0.32 million hectares since the start of the program, 7 regions in the Steppe zone and 1 region in the Forest-Steppe zone remain not certified at all (Figure 10). Such analytics gives evidence of the importance of accelerating the rate of forest certification for social balance. Given the high demand on the social balance of forestry land use, public authorities need to pay more attention to balancing the interests of different stakeholders, and it is the certification that can be a useful tool. Balance of social, economic, and environmental components of forestry land use implies the presence of a system of links and interactions between the components, which must be mutually balanced as a whole or optimally correlated with each other. Ecosystem management requires decisions that take into account the causal relationships between indicators that arise from the response of the indicators to changes in certain factors (Bukvareva et al., 2021). We studied the relationship between labour productivity and salary in state forest enterprises of the State Forest Agency of Ukraine over natural and climatic regions on average for the period 2016-2020. The study revealed a significant differentiation of the regions of Ukraine in terms of the approaches to the formation of income of the state forestry staff (Figure 11). The heterogeneity of the obtained results reflects the great diversity of socio-economic conditions of the regions. In addition, the uneven distribution of forests increases the asymmetry of the interregional social aspect of forestry activities. The highest communication force is observed in the Carpathian zone: the average monthly salary by 97.07% depends on the productivity of state forest enterprises, with the correlation coefficient $r = 0.9852$ being significant. In the Forest-Steppe zone, the average monthly salary by 92.85% depends on the productivity of state forest enterprises; the correlation coefficient $r = 0.9636$ is

also significant. Though in the Steppe zone the correlation coefficient $r = 0.9547$ is also significant, however, the low absolute values of labour productivity indicators in the period 2016-2020 did not ensure a sufficient level of salaries. In the state forest enterprises of the Polissia zone, the average monthly salary depends on labour productivity only by 52.17% with a correlation coefficient of $r = 0.7222$. The results of the analysis demonstrate the social significance of the position of each region in ensuring the balanced use of forestry lands. The social component of the economic activity of state forest enterprises, despite its strong driving force, needs improvement. Therefore, measures for the social balance of forestry activities should be planned by taking into account the current state of management on a regional basis.

The social aspect of forestry land use reflects the state of balancing the interests of stakeholders: the state, forest users, forest management bodies at all levels, and the public. Today in the world, the tendencies connected with introduction of the processes of public control are growing (Bartniczak and Raszkowski, 2018). Galiniene et al. (2019) showed that the problem in forest management is to balance the competing interests of different users. Scientists (Vigna et al., 2021) noted the importance of the participation of the local community in the management of forestry land use as a party interested in environmental, economic and social balance at the local level. Involving the public will help to address imbalances between different aspects of forest use (Lesiuk, 2017). Therefore, the decisive step is to take into account the perspectives and preferences of stakeholders who play a role in decision-making and implementation, by giving different weight to certain aspects, depending on their interests and values (Peters et al., 2015). The forest

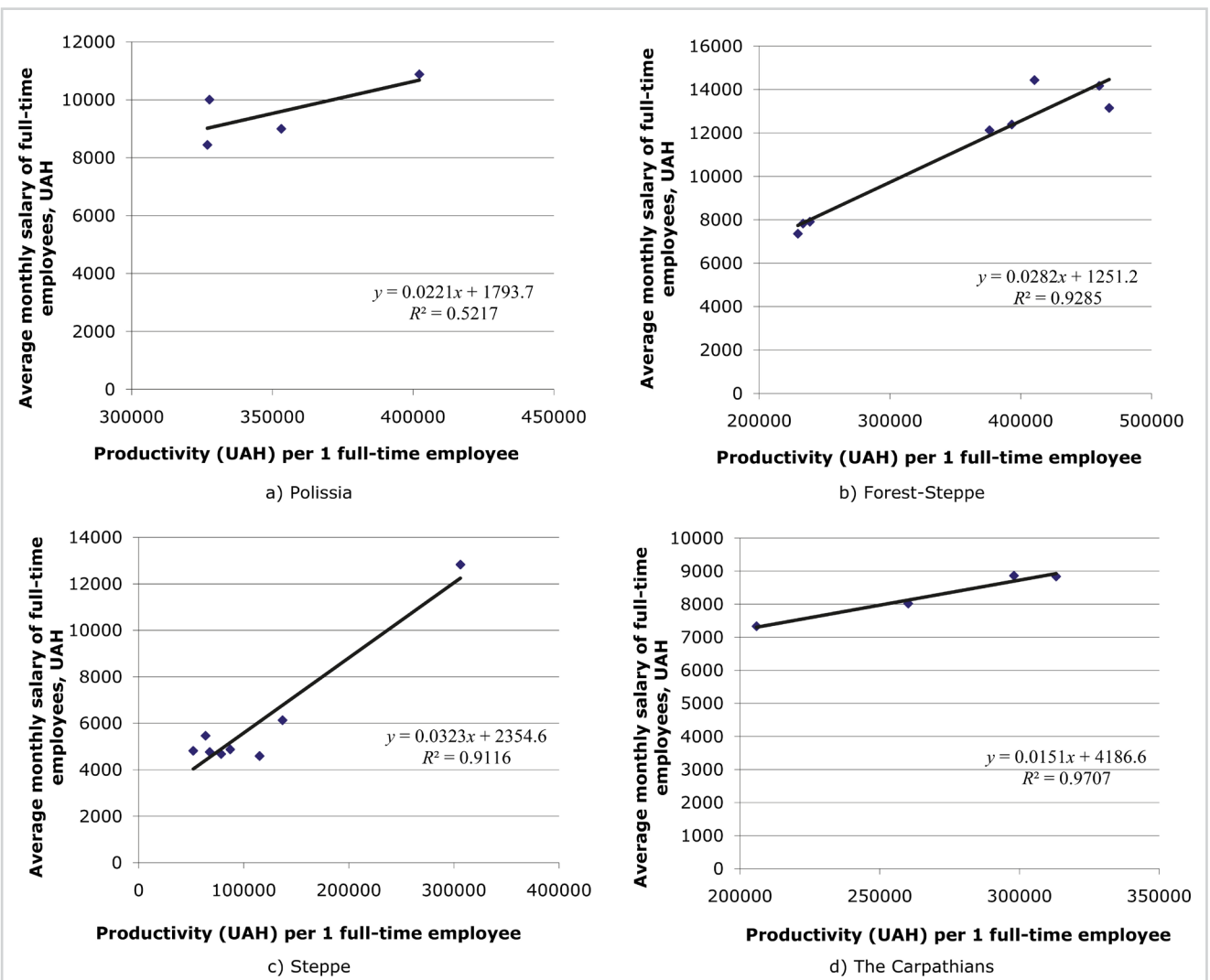


Figure 11:
Correlation field and correlation dependence of the average monthly salary on labour productivity in the state forest enterprises of the State Forest Agency of Ukraine in the period 2016-2020
Source: Composed by the authors according to the reports of the State Forest Agency

industry of Ukraine over the past few years has made a great stride in terms of publicity, openness, and public access to information (Gerasimenko, 2021). The growing interest of the public is in line with the growing need to take into account the social dimension of sustainable forest management (Vigna et al., 2021). The introduction of the reporting on environmental impact in the field of forestry (Ministry of Energy and Environment Protection of Ukraine, 2020). ensures the strengthening of the public influence of open data in the field of forestry. For example, the social impact of open data in forestry helps to combat illegal felling.

The assessment of the possible impact on socio-economic conditions includes assessment of the magnitude, duration, and consequences of the impact on local and regional infrastructure, employment, places of general use of forest resources by the population, places of the special use of secondary forest materials, secondary forest uses and useful forest properties, on the availability of certain forest resources and secondary forest use for the local population after felling, on places of aesthetic, scientific, historical and cultural value, tourist routes, recreation places and related objects of tourist infrastructure (Table 7).

To ensure public awareness, the report is published in the Unified Register of Environmental Impact Assessment (Ministry of Energy and Environment Protection of Ukraine, 2021), and it is

Table 7:
Excerpt from the Guidelines for the Development of an Environmental Impact Assessment Report in the Field of Forestry

Social measures	Description of socially oriented measures
Description of the current state of the environment (baseline scenario) and description of its probable change without the implementation of the planned activity (Description of environmental factors that are likely to be affected by the planned activity and its alternatives)	- Data on employment of the local population; - Data on tourism infrastructure (including employment of the local population in tourism; - Analysis of tourism development potential; marked tourist routes, etc.); - Marked tourist, recreational and scientific-cognitive routes; - Recreational areas identified during forest management; - other places of tourist, scientific, educational, or aesthetic value; - Places of non-commercial use of forest resources by the local population (fishing, collection of plants, berries, and other fruits, mushrooms, etc.) in the form of general use of natural resources; - Places of the special use of natural resources within the forestry in the form of harvesting of secondary forest materials, secondary forest use, and use of useful properties of forests.
Description of environmental factors that are likely to be affected by the planned activity and its alternatives - Population health	In the case of significant emissions of pollutants into the atmosphere or noise levels from harvesting equipment above sanitary and hygienic standards (according to the calculations made in section 1.5), indicate the distance to the nearest settlement or places of permanent or temporary residence, established resort areas and recreation areas. Characterize the revitalization value of forests, in which felling is designed, for the local population.
Socio-economic conditions	Indicate the frequency of floods, landslides, and rock sloughing in the area and their possible connection with the planned felling. Describe the need for wood resources at the local and regional level, the current use and prospects for the use of forest resources other than wood (wood and non-wood), the importance of secondary forest use at the local level. List forest resources (other than wood), the biological stock of which in the areas of planned felling makes up over 50% of the stock of this resource, available to the local population in the region. Describe the current (marked) tourist routes and mass recreation areas in the area of influence of the planned activities, their popularity among the population (average and maximum attendance). Characterize the recreational (for tourism and recreation) value of the forests planned for felling.
Description and assessment of the possible environmental impact of the planned activity - Impact on socio-economic conditions	Evaluate the magnitude, duration, and consequences of the impact on local and regional infrastructure, employment, places of general use of forest resources by the population, places of the special use of secondary forest materials, secondary forest uses and use of forest properties, access to certain forest resources and by-products of forest use for the local population after felling, on places of aesthetic, scientific, historical and cultural value, tourist routes, recreation areas and related objects of tourist infrastructure.
Impact on health of the population	The assessment is carried out in the following cases: a) if the emissions of pollutants into the air or the noise level from felling equipment and felling of trees exceed the established sanitary and hygienic standards on the border with the settlement or places of permanent or temporary residence of people; b) if the ecological situation in the region is unfavourable, in particular, there are large industrial and agricultural polluting production. In this case, the places of continuous felling in relation to populated areas and places of recreation, on the one hand and sources of pollution (air pollution, noise pollution, etc.) on the other hand, are taken into account, and the degree of loss of forest protection zone for the local population is estimated.
Description of the envisaged measures aimed at prevention, avoidance, reduction, elimination of significant negative impact on the environment, compensatory measures (Socio-economic conditions)	To involve territorial communities in works, to take into account their needs in other than wood, forest resources, and secondary forest uses, to conduct feasibility studies of such needs and to look for territorial alternatives for planned activities; to preserve objects of cultural heritage, to carry on traditional and harmless forest practices of forest use (use as recreation areas, picking berries and mushroom, harvesting secondary forest resources, etc.).

Source: Composed by the authors based on the Order of the Ministry of Energy and Environmental Protection of Ukraine dated 02.03.2020 No. 136

also submitted to local self-government bodies and posted on the official website of the State Forest Resources Agency of Ukraine. The Unified Environmental Impact Assessment Register deserves special attention. It is available to users on a separate state portal. The register has a user-friendly interface, with the option to search for various parameters and download scanned copies of documents to assess the environmental impact of a particular enterprise. State forest enterprises report positive social impact regarding job creation for people living in the forestry area, increasing their income, supporting local communities by paying taxes to the local budget; local budgets earn money from rent of forest resources for special use, provision of the population and social institutions with fuel, maintenances of existing and creation of new jobs in the process of felling, employment of the local population in forest harvesting, afforestation and tending forest crops. Key approaches to using the social functions of forests to balance forestry land use include human health, improvement of social well-being, strengthening of existing social relationships, and development of new social relationships, involvement and building community capacity. This allows involving all stakeholders (government, communities, business) in the balanced management of forest lands. That is public behavior that promotes ecological balance and mediates the impact of management on environmental indices, which is also confirmed in the research of Piwowar-Sulej (2021).

The conceptual principle of involving territorial communities is the use and reproduction of forest resources not only as a raw material base but also as a provider of ecosystem services (Tretiak et al., 2020). Ecosystem services, such as carbon capture are attributed to public goods, which social effect is the health of the local population. According to the FAO Global Forest Resources Assessment 2020 (FAO, 2021) total carbon stocks in the world's forests decreased from 668 gigatonnes in 1990 to 662 gigatonnes in 2020 with a simultaneous increase in the carbon stock from 159 tonnes to 163 tonnes per hectare. In the forests of Europe in 1990, the carbon stock was 31.6 gigatonnes, and in 2020, its value reached 39.2 gigatonnes (Table 8).

Yang et al. (2017) showed that rapid growth of the forest industry and adequate investment in forestry made a positive contribution to increasing carbon storage in forest biomass, which led to effective management of environmental issues of protection and socio-economic development. In Ukraine, there is a positive dynamics of carbon stocks compared to many European countries, which opens new opportunities for the recovery of the local population. However, there is no practice of measuring carbon stock at the local level. Therefore, it is advisable to publish these data by taking into account the change in the area of forest land for a certain period and the average local carbon stock per unit area. To introduce such a practice requires appropriate decisions at the national level. In turn, national action plans would be integrated into regional socio-economic development programs and detailed in the regional action plans for the sustainable use of forest lands.

The results of the study on regional differences in the social component of forestry land use emphasize the lack of balanced management. The use of key economic, social and environmental indicators of the monitoring of forestry land use in different areas will allow taking into account

Table 8:
Forest carbon stock, tonnes per ha^{-1}

Country	1990	2000	2010	2015	2020	2020 to 1990 (%)
In aboveground forest biomass						
Ukraine	43.35	56.05	64.94	67.1	69.45	160.2
Austria	70.37	76.89	80.22	82.03	83.84	119.1
Bulgaria	50.98	65.75	74.09	76.06	84.83	166.4
Germany	66.21	79.09	84.51	88.5	92.57	139.8
Poland	44	50	69	73	78	177.3
Romania	50	50	50	94.06	97.52	195
Slovakia	58.8	70.15	79.54	83.9	84.37	143.5
Hungary	45.89	48.08	48.77	50.72	52.91	115.3
Czech Republic	60.64	68.21	73.41	74.59	76.72	126.5
In underground forest biomass						
Ukraine	10.46	13.56	14.45	14.91	15.48	148
Austria	18.29	19.97	20.43	20.67	20.91	114.3
Bulgaria	13.02	15.9	17.71	18.17	20.2	155.1
Germany	10.91	12.37	13.25	13.84	14.44	132.4
Poland	9	10	14	15	16	177.8
Romania	10	10	10	19.04	19.74	197.4
Slovakia	11.76	14.03	15.91	16.78	16.87	143.5
Hungary	11.47	12.02	12.19	12.68	13.23	115.3
Czech Republic	14.87	16.97	18.38	18.74	19.33	130

Source: Composed by the authors based on the FAO data (2021)

the specifics of natural and spatial location of forest lands in each region, which will contribute to the dynamic balance of commercial forest use and ecosystem. We substantiate the necessity of introducing carbon units accounting at the regional level, increasing government subsidies to non-resource regions, intensifying forest certification, improving the system of remuneration on a regional basis, improving personnel policy and staff training, expanding opportunities for public control over forest resources is scientifically, hereby preparing the scientific background for the achievement of ecological policy goals defined by the Basic Principles (Strategy) of the State Environmental Policy of Ukraine for the Period till 2030.

5. Conclusions

The present study, based on the assessment of the relationships and dynamics of selected indicators, highlights the role of social factors in balanced forestry management and the possible reverse impact of environmental changes on the social balance of forestry land. The results of the study revealed regional disparities in social indicators of forest use: the income of employees of state forest enterprises, provision of state forest enterprises with labour resources, professional training, and labour productivity. We carried out quantitative measurements of selected minimum and maximum indicators of the socio-economic development at the local level in comparison to the national level. Based on the identified relationship between capital investment and employment in the forest sector with a significant correlation coefficient $r = 0.9078$, we prove the necessity of introducing a government investment program that would help to balance the economic, environmental, and social aspects of forestry. The influence of the capital investment growth in forestry production on the availability of highly qualified personnel has been studied indirectly through staff training with a significant correlation coefficient $r = 0.816$. The inverse dependence of the influence of the social aspect on the volume of financial assistance ($r = -0.6666$) on the volume of government financing ($r = -0.4477$) was revealed. In the assessment of the impact of selected factors on labour productivity, a direct equal impact of the level of technical re-equipment of the forest industry ($r = 0.7515$) and the level of qualification of employees ($r = 0.7494$) was revealed. The assessment of the impact of labour productivity on the level of salaries showed the direct relationship between the studied indicators over the regions of Ukraine, which requires the implementation of regional policy based on a balanced combination of national and regional interests. The necessity of taking into account the causal links between social and economic indicators of forestry land use is substantiated. Reducing disparities in the social development of forest land use is also possible by supporting the economically weak regions of the Steppe zone. In turn, accelerating the economic growth of regions and territories that have a low level of socio-economic development will improve the environment and, consequently, ensure the balance of forestry.

We showed, that the potential of social balancing of forestry land use in Ukraine is not enough used, since the instrument of forest certification remains not fully used. It is proposed to introduce assessment at the local level and disclosure the data on carbon stocks as a public good. The integration of social considerations into environmental and economic analysis draws attention to the balance in forestry management. The regional differences show the necessity of improving forest management at the national level. In turn, national action plans should be integrated into regional socio-economic development programs and detailed in regional action plans to ensure balanced forestry land use.

The main results of the study open new opportunities for:

1) structuring the social factors of balanced forestry land use;
2) definition of social goals in forestry planning;
3) analysis of the achievement of sustainable development goals at the national and regional levels.

As the balance of the forestry land use is very sensitive to many environmental, economic, and social factors, further studies on the concepts and methods of the balance assessment, as well as on the reverse effect on strategy management are required.

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Received 26.05.2021
Received in revised form 10.06.2021
Accepted 12.06.2021
Available online 21.09.2021