Implementation Completion and Results report
FORESTRY DEVELOPMENT PROJECT
funded by the Loan of the International Bank for Reconstruction and Development, Additional Loan for the project and Global Environment Facility Grant for the project

Republic of Belarus

FORESTRY DEVELOPMENT PROJECT OF THE REPUBLIC OF BELARUS (P147760)

Implementation Completion and Results report from the Client
Ministry of Forestry of the Republic of Belarus
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LIST OF ACRONYMS

BFDP - Belarus Forestry Development Project

EEU - Eurasian Economic Union

ENPI - European Neighborhood and Partnership Instrument

EU - European Union

FLEG - East Countries Forest Law Enforcement and Governance

FSC Forest Stewardship Council

GDP - Gross Domestic Product

IBRD - International Bank for Reconstruction and Development

Mln. - Million

PAD Project Appraisal Document

PDO Project Development Objective

PEFC - The Programme for the Endorsement of Forest Certification

PIU - Project implementation unit

SDG - Sustainable Development Goal

SFE - State forest enterprise

STB - State standard of Belarus

USD – - US Dollar

EXECUTIVE SUMMARY

This report is final one to summarize results of the Project "Forestry Development Project" funded by the Loan of the International Bank for Reconstruction and Development, Additional Loan for the project and Global Environment Facility Grant for the project.

The project is large size, complex and infrastructural. 101 enterprises in the structure of the Ministry of Forestry of the Republic of Belarus are beneficiaries of the project. This is god evidence that the project implementation was carried out all over the country. One more peculiarities of the project funding of the project from different sources, not only from the loan funds of the World Bank, but also from the GEF Grant funds.

The report contains analysis of the project achievements, including project outputs and outcomes. Implementation was carried out within three interconnected components of the project. It can be noted that in the result of the project implementation complex results were achieved, including delivery of highly-productive machinery as well as capacity building of manpower of the forest sector, strengthening of institutional framework of the sector, and improvement of the practice of silvicultural operations. The analysis made demonstrates that all the planned project goals and objectives are achieved in spite of the changes in the process of the project implementation. Changes to the project implementation process were made as was required in line with re-programming of the project funds.

Factors impeding and facilitating project implementation were analyzed. In addition to the institutional, organizational and other factors, one of most strong factors affected the project implemented process was pandemics caused by COVID-19 that was started in 2020. However, in spite of this unprecedented situation, project implementation was not suspended. Revisions to the implementation of project activities were promptly made and all the works within the project were completed in time.

Analysis of other project outcomes and impacts was made, such as impact at institutional strengthening, gender issues, and involvement of private sector.

At the end of the project there are 8 key lessons upon project implementation results and recommendations for development of the results reached and for application in the process of implementation of similar infrastructural projects.

The report contains 5 Annexes, including list of the equipment procured within the project by beneficiaries, Results Framework and Monitoring, list of the contracts concluded within the project, and others. The Annexes supplement the main text of the report and demonstrate the whole scope of the work accomplished within the project during the entire implementation period.

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

1. **County context.** Belarus is a country with small open economy and population of about 9,5 million people. At the time of decision about the project, gross national income per capita was equal to USD 6720 (methodology Atlas, 2013 год). Belarus is at the 53 place out of 189 in the UN Human development Index. with high degree of income equality and good rating assessments of social indicators. The country has strong political and economic relationships with Russia, and is a member of the EEU. Belarus has intensive trade relationships with the EU countries (about one third of the total export scope) and serves as transit corridor between the EU and Russian. In spite of economic reforms held in the country, the state plays the leading role in the country.
2. **Sector context.** Belarus is among European countries with the high percentage of forest coverage of the territory (6 place out of 30 countries). In 2021, the area of forests make 9,8 mln.hectares or almost 40,1 % of the territory of the country (at the time of the project preparation (year 2015) the forests took 8,1 million hectares or almost 39% of the territory of the country). Currently, share of the forest sector in the GDP is equal to 2,7 %., and the volume of export increased up to USD 180 mln. (in 2015 share of the forest sector in the GDP made 2,2%, and volume of export was USD 124 mln.). All the Belarusian forests have possess good timber stock, which is constantly increasing. The forests are professionally and good managed. Obligations of the state in relation to forest inventory and monitoring, forest pathology management, forest fire fighting, fire prevention and control, etc. are organized at high qualitative level within the frames of the available resources.
3. Model of centralized forest management is applied in Belarus. Standard functions of management over the state forest sector are concentrated in one center, which is Ministry of Forestry of the Republic of Belarus.

   Forest is the most important economic resource, which brings good income to the country and thus ensuring possibility for investing into very essential social projects. Forest is source of employment for many thousands of people: private entrepreneurs providing services for the forestry sector, manpower of the forest sector, workers of large timber processing factories.
4. Funds of the state budget are used to financing of: function of state body for forest and forestry management; work of regional branches of the state body for forest and forestry management; reforestation and afforestation; forest conservation and fire management; forest protection; seed management; forest monitoring; state forest cadaster and assessment of the forest fund; forest management planning; research and engineering design works; training, re-training and improvement of skills of forest manpower; public functions.
5. Commercial activities of the forest enterprises are funded from the own income of the enterprises. Main source of revenue are as follows: income from the sale of timber; income from the sale of products (works, services); payments for short-term use of forest fund in the process of sale of standing timber; budget funds for production of products (works, services) within the state orders. Starting from 2013, sale of timber harvesting services at the commercial fellings is done at the auction through commodity exchange.

6. First Forestry Development Strategic Plan of Belarus (hereinafter- "The Plan" was approved in 1997 and covered the period from 1997 until 2015. The Plan was prepared with technical support from the Government of Sweden within the frames of the first Forestry Development Project completed in 2002.

   Key achievements of the first Plan included the following: actualization of the Forest Code and other normative documents; juridical definition of uniform forest fund; development and introduction of forest cadaster and forest monitoring system; development of national forest certification system; introduction of competitive methods of timber sale; and creation of central fund for construction of forestry roads.
7. Second Forestry Development Strategic Plan of Belarus (hereinafter- "The Plan") was approved in 2014 and covers the period from 2015 until 2030. The Plan was developed within the Program "European Neighborhood and Partnership Instrument (ENPI) East Countries Forest Law Enforcement and Governance (FLEG) funded by the European Union.

   The main objectives of the second Plan include: creation of high productive and sustainable forests; conservation and effective use of the biological and landscape diversity of the forests with regard to climatic changes and "green" economy approach; multi-purposive and complex management of forests based on the scientific achievements, high technical equipment and ne technologies; improvement of general and professional culture of the forestry manpower; increase of profitability of the forestry sector and its economic independence; expansion of reproduction of high quality timber for different purposes and non-timber forest products; facilitation to social and economic development of rural territories; creation of new working places in small business in the field of timber harvesting, timber processing and ecological tourism.
8. By 2021, 96 forest enterprises in the structure of the Ministry of Forestry of the Republic of Belarus are certified against PEFC (the Programme for the Endorsement of Forest Certification) within the national certification system of the Republic of Belarus. Total area of the certificated forest is 8,2 mln.hectares. The forest enterprises are certified both on forest management and chain of custody.

   In addition to the certification of forest enterprises against PEFC, 97 forest enterprises in the structure of the Ministry of Forestry of the Republic of Belarus are certified against FSC (Forest Stewardship Council). The total certified forest area is 8,3 mln.ha (more than 86 % of the total area of the forests of the Ministry of Forestry).

Theory of change (or results chain)

9. Priorities of the forest sector and a number of sectoral tasks, which were analyzed in Forest Sector Policy Note prepared by the World Bank in 2013, were served as preconditions for implementation of the Forestry Development Project.

   The research showed that demand for the forest products increased from the side of enterprises of timber processing industry and in the sector of energy production from the wood fuel. In the short-term and mid-term perspectives this could result in deficit of proposals of wood with due regard to the existing stock of tree stands, prognoses of growth of the forest and distribution by age categories. Thus, maximum increase of level of production of forest fund was needed through introduction of more intensive silvicultural methods, which ensure full meeting of the demand from one hand, and improve structure of the forest stands and leveling distribution by age categories from the other hand. Increase of intensity of silvicultural operations facilitates

creation of favorable conditions for: biodiversity in the productive forests; development of ground cover; creation of additional habitats; and improvement of productive function of the forests. Due to utilization of more felling wastes from the felling sites (e.g. tops of the trees, large branches, curved and deformed trunks, and defective timber) amount of wood biomass is increased.

10. In Belarus, forest sites are reproduced through natural reforestation after selective cuttings, where it is possible. However, there is necessity to re-establish some forest sites and to use different species of forest cultures at the forest sites damaged because of windfall, snow, fires, drying of spruce stands and ash-trees (about 6 thnd.ha annually). Thus, there was permanent demand in production of planting material of good quality from the selected plus trees of known origin.

    Modern technologies, which are less influenced by climatic periods, should be introduced into reforestation and afforestation practice, and namely, usage of planting material with closed root system.

    To improve survival rate of the planting material, it was proposed in 2015 to construct (modernize) 4 forest nurseries for production of planting material with the closed root system (not less than 10 mln.pieces annually) for creation of forest cultures on the area of around 6 thnd.hectares annually.
11. In Belarus in general forest fire monitoring and management systems work good. In spite of this, the systems were based on old technologies and approaches to a large extent. It was planned to decrease forest fires due to preventive measures through improvement of awareness raising of the public, usage of more effective mechanisms of prevention, detection and monitoring of the forest, and use of modern technologies of forest fighting.
12. Intensive intermediate cuts in young and middle-aged forests was not common practice in Belarus in 2015. However, such forest stands take 66,6 % of total area of the forests, and intermediate fellings should be done in the stands to improve productivity of these forests due to increase of the increment especially during the first years after the fellings. To improve intensity of the forest fellings, procurement of complexes for the forest cuts, harvesters, and equipment for cleaning of the felling sites was planned.
13. The following issues were also actual for the forestry sector of Belarus: effective forestry management, improvement of complex use of timber material, and usage of forest resources of the country for meeting of public demands. These issues are reflected in the requirements of the modern international initiatives (Agenda of sustainable development till 2030, United Nations Strategic Plan for Forests 2017-2030, and others). Because of this, national forest policy should be permanently updated. Technical and normative basis should be aligned with international and national norms in the field of climate change adaptation, biological diversity conservation, practice of law enforcement in the forest field.
14. Taking into consideration all the above, the decision was taken and in 2015 implementation of the Forestry Development Project started. The budget of the project consisted of: World Bank Loan in the amount of USD 40.714 mln., GEF Grant in the amount of USD 2.739726 mln., and Additional Loan allocated in 2018 in the amount of EUR 12.0 mln.
15. In the result of the project implementation, forest legislation of Belarus was actualized based on the international experience and to ensure harmonization with the international standards (11 normative documents were developed and officially approved, including standards, programs, strategies, etc. (titles are given in the points 47 and 50 of this report)). New innovative practices of forestry management, with due regard to the biodiversity conservation in the

process of forestry management planning, usage of all the ecosystem services provided by the forests, were introduced. These changes demonstrate change of the institutional framework of the country in the field of forestry management and will have long-term impact.

16. The following effects can be already mentioned in short-term perspective:
    - due to the project implementation technology of production of planting material with the closed root system is widely used in all the forest enterprises;
    - intermediate fellings are done with the use of high productive equipment that also ensures safe labor conditions for the staff;
    - improvement of effectiveness of afforestation, reforestation and forest restoration, as well as increase of usage of felling wastes are ensured;
    - more intensive silvicultural methods are introduced that ensures improvement of the structure and productivity of the forest stands, optimization of production of wood biomass and usage of products;
    - developed system of scientifically justified silvicultural operations and technologies ensures conservation of biological and landscape diversity, and protective functions of forests;
    - modern technologies for prevention, detection, monitoring and fighting of forest fires are introduced.
17. More detailed results and outputs under all the directions of the project are reflected in the report below. Video on the project results can be found following the links: https://www.youtube.com/watch?v=TSmLGbXNsxA&t=3s, https://www.youtube.com/watch?v=4fBzZqsI7rQ&t=12s

Project Development Objectives (PDOs) (fixed, do not edit)

18. The Project Development Objective (PDO) is to enhance silvicultural management and reforestation and afforestation, increase the use of felling residues and improve the public good contribution from forests in targeted forest areas.
    In the process of the project implementation, the objectives were not changes and are fully achieved at the end of the project.

Key Expected Outcomes and Outcome Indicators (fixed, do not edit)

19. Based on the PDO, this project has three outcomes: (a) to enhance silvicultural management and reforestation and afforestation in targeted forest areas; (b) to increase the use of felling residues in targeted forest areas; and (c) to improve the public good contribution from forests in targeted forest areas.

Higher Level Objectives to which the Project Contributes

20. The project facilitates achievement of the second part of twin goals of the World Bank and namely, end extreme poverty and boost shared prosperity through increase of the income due to improvement of production in the forest sector that will allow creating more qualitative jobs and possibilities for deep processing and value-adding.
21. The project is in line with the second of the three pillars of the Country Partnership Strategy for years 2014- 2017) between the Republic of Belarus and the World Bank, which has the

strategic objective of improving efficiency and quality of public infrastructure service, enhancing sustainable use of agricultural and forestry resources and increasing provision of global public goods.

22. The project also fits with the World Bank Group's Environment Strategy (2012-2022), which in Europe and Central Asia (ECA) aims at promoting sustainable forest management, with an emphasis on governance, the role of communities and the private sector, conservation and environmental services, including carbon sequestration.
23. The project contributes to implementation of the Forestry Development Strategic Plan of Belarus for the period from 2015 until 2030 developed within the Programme "European Neighborhood and Partnership Instrument East Countries Forest Law Enforcement and Governance" funded by the EU.
24. Project was implementing based on:
    - Loan Agreement between the International Bank for Reconstruction and Development and the Republic of Belarus as of 2 April 2015, No. 8474-BY, for the amount of USD 40.714 mln. ;
    - GEF Grant Agreement between the Republic of Belarus and IBRD, acting as implementing partner of the Global Environment Facility, as of 2 April 2015 No. TF0A1173-BY, for the amount of USD 2.739726 million.
    - Loan Agreement (Additional Financing Loan Agreement for the Forestry Development Project between the Republic of Belarus and International Bank for Reconstruction and Development as of 11.04.2018 No. 8821-BY for the amount of EUR 12.0 mln.
25. To contribute to the implementation of the Forestry Development Strategic Plan for the period from 2015 until 2030, the following activities were implemented using GEF Grant funds: improvement of legislative and normative and legal basis with the development of new methods and technologies on forest fund monitoring, forest management planning and forest inventory; upgrading of forest fire zoning; monitoring of forest radioactive contamination; training of specialists on updated technologies of forestry management.
26. Project implementation contributed to realization of Schedule of examination of forest sites for assessment against criteria applied for nature protective territories (approved on 29.04.2016). This resulted in examination of the territories of 6 forest enterprises (Klichevskij, Glubokskij, Tolochinskij, Bogushevskij forest enterprises, and Vetkovskij and Narovlyanksij special forest enterprises), identifying of forest sites that need to be specially protected, and approval of forest management plans based on new requirements of the Forest Fund on biodiversity conservation.
27. The project provided clear understanding on input of the forestry sector into achievement of the sustainable development goals. Current national indices for achievement of the SDG 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss" were analyzed. Indicators of achievement of national indices related to the forestry sector were developed. Indicators of achievement of 6 global goals on the forests and 26 related tasks of the United Nations Strategic Plan for Forests 2017-2030 were elaborated. Recommendations on reporting on input of Belarusian forests into achievement of global goals were prepared.

Project partners and beneficiaries

28. Within the project implementation, equipment for forestry management was supplied to 101 organizations in the structure of the Ministry of Forestry.

All the staff of forest sector are direct beneficiaries of the project. By 2021, total number of workers of the sector is 38,5 thousand people, out of which women make 17,7%.

29. The following partners were involved in the research works within the project: State Scientific Enterprise "Institute of Experimental Botany named after V.F.Kuprevich of the National Academy of Sciences of Belarus", State Scientific Enterprise "Institute of Forest of the National Academy of Sciences", Educational Institution "Belarusian State Technological University", Unitary Enterprise "Belgosles", Enterprise "Bellesozashchita", Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector, Private Unitary Enterprise "Softmax Systemy Telemetrii", etc. All the partners took part in the workshops and roundtables held within the project.

Main results by the project components

30. The project includes 3 components, which are financed from the funds of the Loan No. 8474-BY, Loan No. 8821-BY, and GEF Grant No. TF0A1173. Project was implemented in line with the World Bank rules and procedures, PAD, decisions of the project Steering Committee, Operational Manual of the project, Procurement plan, and recommendations of the World Bank Aide Memoires. At the national level the Law of the Republic of Belarus No. 299-3 as of15 July 2015 was adopted on ratification of the Loan Agreement between the Republic of Belarus and IBRD signed on 2 April 2015.

31. Taking into account specifics of the project funding, and namely GEF Grant as one of the financial sources for the project, the most essential project results achieved using GEF Grant fuds are given in the Annex 5.

Usage of the funds by the project component is given in the table below

USD million

	Component	Source of funding	Plan as the project procurement plan	Actual	Deviation	Percentage of using the funds, %
1.	Component 1. Improving silviculture and the sustainability of forest management	Loan № 8474-BY	37,992	37,992	0,00	100
		Loan № 8821-BY	11,868	11,868	0,00	100
	Component 1: Improving silviculture and the sustainability of forest management through the development of more intense silviculture; optimizing the intensity of silvicultural interventions in young and middle-aged stands; increasing the use of logging residues for production of woody biomass; and improving the quality of seedling production for afforestation and reforestation	GEF grant №TF0A1173	0,44244	0,44244	0,00	100

	Component	Source of funding	Plan as the project procurement plan	Actual	Deviation	Percentage of using the funds, %
2.	Component 2. Improving forest fire prevention, monitoring, detection and suppression	Loan № 8474-BY	2,722	2,722	0,00	100
	Component 2: Improving forest fire prevention, monitoring, detection and suppression including increasing prevention activities (e.g. raising public awareness,), increasing the use of video and communications equipment to improve monitoring, surveillance and detection and the provision of fire-fighting equipment to help extinguish the fires once started	Loan № 8821-BY	0,132	0,132	0,00	100
		GEF grant №TF0A1173	0,22155	0,22155	0,00	100
3	Component 3. Building the capacity for sustainable forest management	№TF0A1173	1,932	1,932	0,00	100
	Project management (audit, consultant services)		0,03496	0,03496	0,00	100
	Operational costs (including study tours)		0,10858	0,10858	0,00	100
	TOTAL	**Loan № 8474-BY**	40,714	40,714	0,00	100
		Loan № 8821-BY	12,000	12,00	0,00	100
		GEF grant №TF0A1173	2,73973	2,73973	0,00	100

32. In the process of the project implementation 25 contracts were concluded using the funds of the main Loan for the construction of 4 forest nurseries and procurement of equipment, and 25 contracts using the funds of the Additional Loan (Annex 4).
70 contracts were concluded using the funds of GEF Grant for the procurement of equipment for the total amount of USD 0.59 mln., and for the procurement of consultancy services for the total amount of USD 2.14 mln.

Component 1: Improving silviculture and the sustainability of forest management through the development of more intense silviculture; optimizing the intensity of silvicultural interventions in young and middle-aged stands; increasing the use of logging residues for production of woody biomass; and improving the quality of seedling production for afforestation and reforestation;

33. 4 forest nurseries for production of planting material with closed root system were built within the project in Brest, Vitebsk, Minsk and Mogilev regions:

• forest nursery in the State forest enterprise (hereinafter- "SFE") "Ivatsevichskij forest enterprise" was launched in April 2018; 13 new jobs were created (including 6 permanent and 7 seasonal jobs); cost of the construction is USD 2.95 mln.;

• forest nursery in the State experimental enterprise "Glubokskij forest enterprise" was launched in October 2018; 14 new jobs were created (including 4 permanent and 10 seasonal jobs); cost of the construction is USD 4.85 mln.;

• forest nursery in the Republican Selection and Seed Centre was launched in September 2019; 26 permanent new jobs were created; cost of the construction is USD 5.82 mln.;

• forest nursery in the State forests enterprise "Mogilevskij forest enterprise" was launched in September 2020; 19 new jobs were created (including 4 permanent and 15 seasonal jobs); cost of the construction is EUR 2.2 mln.

34. The newly constructed forest nurseries allowed to increase amount and quality of seedlings with closed root system for reforestation and to establish 72 new jobs in the respective regions.

    Total annual capacity is more than 17 mln.seeds per year. This allows to create forest cultures from the seeds with the improved characteristics on the area of 6 thnd. hectares annually. In 2015, 1 mln. seeds with the closed root system were produced in the forest enterprises annually.

35. New forest nurseries were equipped with the all the necessary additional equipment to ensure their full operation during the planting season.

    The equipment procured includes: lines for filling up the cassettes with substratum and planting of seeds; cassettes of types 64 FD and 100 FD; metal frame constructions for installation of the cassettes in the greenhouses and on the growing fields; boxes, containers, and racks for storage of the planting material; multi-functional loaders and elevators. This equipment was purchased additionally (apart from the cost of the construction works) using the funds of the loan No. 8821-BY in the amount of EUR 1.9 mln. and the funds of the loan No. 8474-BY in the amount of USD 0.7 mln.

36. New nurseries in the forestry sector allowed to broadly introducing innovative technology of reforestation using the seedlings with the closed root system. This will result in creation of economically valuable forest stands in Belarus and facilitate export of the planting material.

    Important function of the forest seed nurseries is possibility to produce planting material with the closed root system. Usage of this technology reduces time needed for growth of the planting material, and allows doing reforestation practically all year round except winter. Besides, survival rate of the seedlings with the closed root system is around 95 %, thus, losses are almost equal to zero. For comparison, survival rate of the seedlings growing in the open ground makes around 80%. To ensure possibility of introduction of new technology of production of planting material with closed root system, construction works were procured, including in the amount of USD 13.6 mln. (3 contracts for the construction of high technological forest nurseries with closed root system) from the funds of the main Loan and 1 contract in the amount of EUR 2.2 mln, from the funds of the Additional Loan.

    Today usage of the technology of closed root system is very actual for Belarus as the climate is changing and becoming warmer. Forest stands play significant role in mitigation of climate change consequences not only due to absorption of greenhouse gases, but also because of formation of more stable landscapes. Forest stands regulate water regime, improve soil

conditions and preserve soils for the agricultural usage, and also contribute to creation of migration corridors for the plants and animals.

Ex situ collection of forms of forest plants resistant to climate stress and representing rare and economically valuable tree species was created. The collections was established on the area of 3.05 ha. 1214 seedlings and saplings of more than 35 coniferous and deciduous wood species and their varieties were planted. The *ex situ* collection is highly practically oriented product ensuring production of biologically sustainable and economically valuable planting materials.

37. Other equipment, as attachments to the procured, was also purchased for the forest nurseries for 3 forest enterprises using GEF Grant funds, in particular: mechanical shovel for soil treatment, root clearing saw, digging machine, plow, Nizinskij harrow, Krokovskij roller, and device for cleaning of felling sites from the felling wastes. Usage of this equipment resulted in improvement of productivity. Labor protection and safety conditions of the staff of forest nurseries were also improved.
38. Additionally, equipment was procured and delivered to 78 forest enterprises having small-size forest nurseries using GEF Grant funds, which includes: protective sets and sprinklers for treatment with chemical compounds against weeds, for spraying compounds protecting the plants against pests, and for feeding of the plants and granulated fertilizers. Due to usage of the protective sets and sprinklers, safe working conditions for the staff in the process of treatment with chemicals in forest nurseries are ensured.
39. 2 chopping portable machines processing timber into the chips were procured and given over to SFE "Smolevichskij forest enterprise" and SFE "Uzdenskij forest enterprise". This technology reduces fires risks because of the felling wastes left in the forests.

    Practical timber harvesting works with preservation of valuable characteristics of the timber were improved due to usage of **modern harvesters and forwarders**.

    195 units of machinery (harvesters and forwarders) were procured within the project to ensure constitution of high productive forest stands, and for intermediate fellings in the young and middle-aged stands. All the harvesters and forwarders were supplied in the years 2016-2021 to 78 forest enterprises and are exploited since 2016.
40. Usage of new technologies of the intermediate fellings results in improvement of stability of the forest stands against climatic changes and hurricanes, reduction of timber losses, and ensuring effective harvesting of trees and bushes preventing growth of the trees of the min species.
41. 195 high-qualified safe working places were created due to the usage of new machinery. Productivity of the work is increased as well as labor protection and safety conditions of the staff of forestry sector.
42. Simulators for training of operators of harvesters and forwarders for forest sector were procured using GEF Grant funds. Regular practical trainings on timber harvesting using multi-operational machinery of new generation are held at the Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector of the Ministry of Forestry. In 2018-2021, 405 specialists of the forest sector were trained.

Component 2: Improving forest fire prevention, monitoring, detection and suppression including increasing prevention activities (e.g. raising public awareness,), increasing the use of video and communications equipment to improve monitoring, surveillance and detection and the provision of fire-fighting equipment to help extinguish the fires once started;

43. To equip forest enterprises with new equipment for forest fire fighting, **off-road fire trucks** (42 units) and utility vehicles for forest protection service (31 units) were procured and delivered to 45 forest enterprises. Thus, around 10% of all the machinery for fires fighting available in the forests enterprises was procured using the project funds.

    The machinery allowed for prompt delivery of the water and firefighting crews of forest enterprises to the fires in the forest stands, and facilitated extinguishing of fires in the minimum shortest time.

    Additionally, for SFE "Polesskij forest enterprise" equipment for forest fire extinguishing was procured using GEF Grant funds, including motor pumps, fire hoses, backpack fire extinguisher.

    Inventory of dried peatlands and those inefficiently used in agriculture and for industry purposes with the total area of 6,7 thnd.ha (0,7 % of the total peatlands in the forest fund), which were transferred to the forest fund, was done. Analysis of fire preventive measures for each peatland was made. Schemes of organization of territory to minimize risk of fires for each peatland were developed (activity 2.3., Annex 6 "Final booklet upon activities of the GEF Grant").

44. Purchase of video surveillance systems (3 units) provided for permanent monitoring over the forest fund for timely detection of forest fires on the territory of 2 SFEs (Ushachskij forest enterprise and Novogrudskij forest enterprise). This makes 0,5% of all the video cameras used for detection of forest fires in the forest enterprises. Currently, 100% of the territory of the forest enterprises are covered by vides surveillance.

45. Prevention activities through raising public awareness via mass media play the most significant role for prevention of forest fires as actions of the people cause 90% of fires in the forests.

    Social animated video was produced to enhance measures on prevention of forest fires. The video was produced using GEF grant funds.

    The purpose of the video is to ensure propaganda of safe treatment with the forests and draw attention of the public to the necessity of following of rules of proper behavior in the forests.

    During the fire dangerous seasons in 2019-2020, the animated video was broadcasted at the TV channels in prime time, in internet, in the cinemas in all the regional centers, in Minsk metro, and at Minsk bus station "Centralny". As of now, 2 million people could see this video. Broadcasting of the video is planned on annual basis in the Springs during fire dangerous seasons.

46. To ensure carrying out of new functions delegated by the Ministry of Forestry, equipment for testing and repair of fire hoses as well as utility vehicle for transportation of the workers were procured for the Enterprise "Bellesozashchita" using GEF Grant funds. This ensures technical maintenance of fire hoses (drying, rolling to another edge) in the forest enterprises of the sector before the start of top fire season and, consequently, improves preparedness of the forest protection service to the fire fighting.

47. Policy in the field of forest fire zoning was updated. Amendments to the Technical code of common practice "Rules of firefighting arrangement of forests of the Republic of Belarus" were developed and approved by the Order of the Ministry of Forestry as of 28.04.2017 No.9. Map of forest fire zoning of the territory of Belarus was actualized.

Component 3: Building the capacity for sustainable forest management through creating the enabling environment to allow for the development of more intense silviculture; piloting the enhancement of biodiversity values in production forest and also in developing resistance of forest to climate change through silvicultural intervention; enhancing the forest management information system (including forest carbon monitoring); development of and training in the use of advanced technologies; and developing appropriate management approach for the rational use of radioactively contaminated forest.

48. To create favorable conditions for introduction of modern technologies in the forest sector **normative and legal, and technical legislative documents** were actualized using GEF Grant funds. The work was done based on the international practice of forestry management with due regard to the forestry adaptation to climate changes, biodiversity conservation, creation of high productive stands, and effective use of the wood resources.

49. Modern methods of special forest management planning with the use of new equipment and remotely piloted aerial vehicles were analyzed. Technologies of reconstruction of low value forest stands were tested as well as technologies of reforestation of fellings sites of dried coniferous stands. Influence of removal/ non-removal of felling wastes during commercial fellings and intermediate cuts on the level of carbon emissions in the forest stands was analyzed.

    Recommendations on updating of normative and legal and technical legislative documents of the forest sector were prepared.

50. New version of Regulations on organization of forest monitoring and usage of monitoring data was developed and approved by the Resolution of the Government as of 04.11.2016 No. 907. State program "Belarusian Forest" for 2021-2025 was developed and approved by the Resolution of the Government as of 28.01.2021 No.52.

    Rules for the control of radioactive contamination in the system of the Ministry of Forestry were amended and approved by the Order of the Ministry of Forestry as of 03.02.2017 No. 36. Rules for forestry organization at the territories contaminated in the result of Chernobyl accident were developed and approved by the Resolution of the Ministry of Forestry as of 27 December 2016 No.86.

    Amendment No. 1 to the Technical code of common practice 240-2010 "Exploration of lands of forest fund" was developed and approved by the Resolution of Ministry of Forestry as of 24.10.2016 No. 24 and is valid from 01.04. 2017.

    Amendment No. 2 to the Technical code of common practice 239-2010 «Exploration of forest felling sites" was developed and approved by the Resolution of the Ministry of Forestry as of 4.11.2016 No. 29 and is valid from 01.04. 2017.

    Two above mentioned technical normative documents stipulate requirements to the forestry management in the radioactive contaminated zones.

    New version of the following State standards of Belarus (hereinafter- "STB") were developed: STB 1708 "Sustainable forest management and forest use. Basic requirements"; STB "Group certification of forest management and forest use systems. Requirements"; STB 2157–2016 (PEFC ST 2002:2013) "Identification of timber and non-timber forest products upon origin. Basic requirements".

    Strategy and Action Plan on adaptation of Belarusian forestry to the climate change, increase of greenhouse gases absorption, and introduction of "green economy" principles were developed and approved at the session of the Scientific and Technical Council of the Ministry

of Forestry as of 28.06.2019 No. 4. The following methodical documents were also developed envisaging introduction of new innovative practices: Methodical document on reconstruction of low value forest stands to increase share of broad-leaved forests; Recommendations on reforestation of felling sites of dried pine and spruce forest stands; Methodology of evaluation of carbon sequestration by felling wastes during commercial fellings (clean and non-clean fellings) and during intermediate cuts by the main forest trees species.

51. Modern software products were developed using GEF Grant funds. The advanced software products ensure automation of processes in such fields as forest monitoring, forest seed and nursery management, forest restoration, radioactive forest monitoring, and improvement of analysis of forest management planning documentation.

52. Intensive training of specialists of forest sector to work with new methods and technologies developed within the project was organized. 1700 people gained new knowledge at the trainings and roundtables held within the project. All drafts normative documents were discussed at the workshops and roundtables, with participation of staff of forest enterprises, representatives of scientific and public organizations. Upon completion of 7 project activities, final booklets and instructions for users of new software were published. Booklets and instructions were disseminated among the forest enterprises on paper and uploaded to the internet to the websites of the Ministry of Forestry, Unitary enterprise "Bellesexport", and Unitary enterprise "Belgosles". All the materials will be available after the project completion as well.

53. To ensure training of high-qualified specialists for the forest sector and improvement of educational process, 11 new programs and lectures were developed. This especially vital taking into account fast development and introduction of new technologies in the forest sector, which are also based on the findings accomplished within the project. The programs cover the following topics:

- Intensive methods of production of forest planting material;
- Innovations in current forest management and planning;
- Silvicultural operations in the conditions of nature and anthropogenic anomalies;
- Innovations in timber harvesting production;
- Improvement of effectiveness of forest nurseries and production of high-quality forests;
- Forest adaptation to the climate change, including risk assessment in long-term perspective;
- Stretching of chain of custody and certification;
- Forest fire prevention in Belarus: new instruments and methods of communication with population;
- Improvement of effectiveness of concrete managerial and field processes through application of technologies and IT solutions;
- Promotion of sustainable tourism;
- Improvement of managerial potential, including development of strategy, leadership, and manpower management.

Since Autumn 2021, the programs are included into educational process of the Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector of the Ministry of Forestry.

54. Remotely piloted aerial vehicle was procured for the Unitary Enterprise "Belgosles" using GEF Grant funds, with the purpose to: monitor over the conditions of the forest fund; to monitor organization of forest protective measures; and to monitor over the fires, in order to

have real-time data. In addition, vehicle for transportation of the mentioned equipment and group of forest pathologists, staff of the Unitary enterprise "Belgosles, were purchased.

55. Film with the project results and 8 social videos were produced using GEF Grant funds. The videos cover the following topics: main achievements in reforestation and forest production; function of new forest seed centers; forest contamination management; forest fire management; people working in the forests; professional orientation of children; school forestry units. The videos are downloaded to the websites of the Ministry of Forestry and Unitary Enterprise "Bellesexport". These videos are planned for broadcasting at the TV channels and in internet.
56. Amount and titles of the equipment supplied for each forest enterprise within the Loans No.8474-BY and No. 8821- BY, and the list of all the researches done using the funds of the GEF Grant No. TF0A1173- BY are given in the Annex 2.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

Changes in 2016

57. Usage of mobile chopping machines for processing of wood residues allow widely use of timber for energetic purposes and reduces risk of fires because of the felling wastes left in the forests.

    Initially, procurement of 11 such machines was planned within the project. However, own capacities on processing of wood residues into the chips were created at the forest enterprises, and it was decided to reduce number of machines to be procured and to re-distribute funds to support construction works in new forest nurseries and for additional procurement of harvesters and forwarders (12 units).

    2 mobile shopping machines were procured for cutting of felling wastes (boughs, tops of the trees) after commercial and intermediate fellings for SFE "Smolevichskij forest enterprise" and SFE "Uzdenskij forest enterprise".
58. Saved funds were used for the additional procurement of harvesters and forwarders (12 units) following simplified procedure to ensure prompt and effective respond to the emergency situation happened in the forests of the Republic of Belarus in result of hurricane winds in June-July 2016. Government of Belarus declared the situation as emergency one because of considerable damage to the forest stands. To address the consequences, clean sanitary fellings on the area of 10 thnd, hectares were required.

    Ministry of Forestry requested the Bank to consider possibility of purchasing of harvesters and forwarders (12 units) for the amount of USD 1.99 million under direct contract. On 29 August 2016 permission of the World Bank for direct contracting was received. Machinery allowed removing windfall wood in the shortest time that, in its turn, led to preservation of high quality of the harvested wood and allowed preventing damage of the timber with the pests.
59. Initially, as per 2015 procurement plan the funds of the main Loan should be used for the procurement of greenhouses, lines for cassette planting, refrigerators, irrigation systems at the growing fields in 6 regions, per one in each region, in Brest, Vitebsk, Gomel, Grodno, and Mogilev regions and for Republican Forest Selection and Seed Centre in Minsk region, for the total amount of USD 6.6 million. Construction of 6 new forest nurseries was planned to be executed using the own funds of the forest enterprises.

However, after development of engineering design documentation for the construction forest nurseries in 2016, it was decided to include cost of the construction works into the project Procurement plan in the amount of USD 13.6 million for 2 forest enterprises in Brest and Vitebsk regions, and for the Republican Forest Selection and Seed Centre in Minsk region. These works were financed from the funds of the main Loan. Funding of the construction of other three forest nurseries, in Mogilev, Gomel and Grodno regions, was planned using the funds of the Additional Loan.

Re-structuring in 2018

60. In March 2018, Additional Loan for the project in the amount of EUR 12.0 million was approved, with delivery period of 3 years until 31.08.2021. Simultaneously completion date of the main Loan was also shifted until 31 August 2021. Usage of the GEF Grant funds in the project budget was also extended till 31 August 2021 (letter of the World Bank Mission as of 19 September 2018 No.432/09-2018).

    Funds of the Additional Loan were given for increase of some planned investments within Component 1: Improving silviculture and the sustainability of forest management.

    In particular, they were intended to be used for the construction of three forest seed nurseries for production of planting material with closed root system for the amount of EUR 11.20 million, for the procurement of cassettes for planting of seeds of the main forest tree species (EUR 0.60 mln.), and for the procurement of multi-operational timber harvesting machines (harvesters) for intermediate fellings for the amount of EUR 0.20 mln.

61. However, after approval of the Additional Loan, forest sector of Belarus more clearly understood significant increase of forest area influenced by climatic problems that resulted in dying of the trees, and namely considerable infestation of coniferous stands by the bark beetles. Abnormal high temperatures and small amount of precipitations in the summer 2018 boosted the problem. As of 1 October 2018, the area of the dried forest made about 29,8 thousand hectares. Forest enterprises in Gomel and Grodno regions suffered most of all. Drying, dead and weak stands make serious danger for the whole conditions of the forests. Dried forest sites are significant fire hazard, and pests in the trees, damaged by the climatic stress, move to the healthy forest sites. Cleaning of such sites and forest restoration with appropriate mixture of species at respective distances is good silvicultural practice. Thus, Ministry of Forestry addressed the Bank with the request to change the use of the funds of Additional Loan and to procure more number of timber harvesting machinery (31 units instead of 2 planned) and to reduce number of forest nurseries (4 nurseries instead of 6 planned).

62. In the result, the funds of the Additional Loan were used for:

- procurement of multi-operational timber harvesting machines for use in the process of intermediate fellings (31 harvesters). Purchase of this equipment was required for creation of high productive forest stands Procured equipment was transferred to the forest enterprises of Grodno, Gomel and Mogilev regions, and put into exploitation since 2020. The equipment demonstrated its effectiveness and ensured safe labor conditions;
- construction of forest seed nursery in Mogilev forest enterprise for production of planting material with closed root system, and for the procurement of additional equipment for effective function of the nursery;
- off-road trucks for extinguishing of forest fires with water and for transportation of fire and technical equipment and water to the fire site for Mogilev forest enterprise (2 vehicles).

Ministry of Forestry managed to treat with the drying forest stands because of bark beetle with its own resources. Multi-functional wood harvesting equipment procured within the project facilitated organization of intermediate cuts in the stands.

63. This re-distribution of the funds did not affect adversely plans for the production of planting material with closed root system for the forest sector of Belarus because the capacity of 4 new forest nurseries allow for growing of more than 25 million seedlings annually due to installation of equipment with better productivity (cassettes of FD64 and FD100 types have more number of planting cells in comparison with the initially planned for procurement cassettes of type 32).

64. Simultaneously with the mentioned re-distribution of the funds of Additional Loan, in 2019 Ministry of Forestry requested to revise project Results Framework and to reduce number of planting lines in new forest nurseries from 6 to 4 units, and consequently reduce amount of produced seedlings with closed root system from 23.7 mln.pieces to 13.9 mln. pieces. It was also proposed to reduce indicator "Amount of carbon sequestered" from 5.2 mln. Metric tons to 4.7 mln. Metric tons.

However, the World Bank clarified that amendment of the Results Framework could not be done at that stage because the amendments were proposed close to the project completion.

The World Bank refused of the re-structuring, but agreed with the proposed re-distribution of the funds of Additional Loan without amending indicators of the Results Framework.

Pandemics caused by COVID-19 since 2020

65. It should be noted that there was no disruption of delivery of equipment from Europe within the project activities in spite of the quarantine at some productions and delays in transport logistics. Project implementation unit was communicating with the suppliers permanently, and during the most difficult period kept working in the office. All the reports to the Bank were prepared and submitted in time. All the COVID-19 preventive measures at the construction sites of the project were followed.

66. Limitation of organization of some events also did not influence the final project results. Due to prompt changes in the project implementation approach, all the planned training events within the GEF Grant were held using remote methods of training and electronic communication means. Potential of project partners in the field of communication, usage of innovative electronic communication means was improved. This also allowed to train and to involve into the project implementation staff of forest enterprises from the most remote settlements of Belarus. Despite the fact that some study tours for the specialists of Belarusian forestry to other countries did not take place, possibilities of virtual remote meetings and trainings were used.

67. **In July 2020** due to change of project implementation approach because of COVID-19, there were savings of the funds within the activities funded from GEF Grant under 1-3 project components in the amount of USD 0.15 mln.млн. долларов США. Thus, the following costs were reduced: costs for training of forestry specialists on sustainable forest management, expenses for study tours of the project implementation unit, cost of financial audit, consultancy services for verification of the reports, and savings of the funds for procurement of equipment and banking services.

68. To ensure effective usage of the GEF Grant funds, decision was made at the meeting of the Steering Committee on cancellation of 3 activities, in particular: development of sub-system of evaluation and gradation of forest fund objects depending on their potential on carbon

dioxide absorption (this has been done using the fund of the state budget); training of personnel of the pilot forest enterprise and operators of multi-operational forest machines (cost of the activities was include into each contract for the supply of equipment within the project).

69. Savings were re-distributed between 1-3 components and used for the procurement of:
- Kits of individual protection means (overalls, respirators, half-masks) and sprinklers for 78 forest nurseries and for the Enterprise "Bellesozashchita". Procured equipment ensured safe labor conditions for the staff while working with chemicals and radioactive materials;
- Equipment for testing and repair of the fire hoses (drying, rolling to another edge), and vehicle for transportation of this equipment and specialists of the Enterprise "Bellesozashchita";
- Remotely piloted aerial vehicle for the Unitary Enterprise "Belgosles" (1 unit), which is used for shooting of the forest fund, obtaining real-time data, monitoring over the forest conditions, timber harvesting, forest protection measures and forest fires;
- Production of information videos on forestry sector of the Republic of Belarus (9 videos), including video on the project results and 8 social videos on: main achievements in the field of reforestation and forest production; function of new forest seed centres; forest contamination management; forest fires fighting; people working in the forests; professional orientation of the children; and school forestry units.

70. **In January 2021,** funds allocated to study tours of the specialists and national experts to learn practical experience of forestry management in European countries were used for the procurement of vehicle and additional equipment for forest pathologists of the Unitary enterprise "Belgosles" that allowed to practically introduce usage of modern measuring devices for analysis of forest stands.

II. OUTCOME

A. RELEVANCE OF PDOs

71. Project development objectives are achieved. PDOs were actual for the whole duration of the project implementation. Progress in achievement of PDOs is satisfactory, that planned targets of 4 out 5 indicators are increased, and 9 out of 10 intermediate results indicators are achieved or the planned targets even increased.

72. PDO indicators are given on the Results Framework and Monitoring and consists of three blocks (Annex 3):

1. Project Development Objective Indicators comprise:

i. Area of young and middle-aged production-forest thinned according to approved management plans;

ii. Economic performance of participating SFEs enhanced;

iii. Capacity to produce high quality seedlings increased;

iv. Average utilizable volume of commercial timber harvested during intermediate felling in targeted SFEs increased.

2. Global Environmental Objective Indicators:

Quantity of carbon sequestered.

3. Intermediate Results Indicators:

- Amount of carbon sequestered;
- Nursery lines for container grown seedlings of native tree species established;
- Improved thinning regime developed;
- Number of people trained;
- Number of people trained – female;
- Reforms in forest policy, legislation or other regulations supported;
- Governmental institutions provided with capacity build to improve management of forest resources;
- New areas outside protected areas managed as biodiversity-friendly;
- Project-supported organization(s) publish reports on inputs and effect of consultation and information dissemination activities on project/program/policies;
- Direct project beneficiaries;
- Female beneficiaries.

73. From the beginning the project objective were formulated correctly and did not lose their value during the whole period of the project implementation.

Effectiveness of afforestation, reforestation and forest restoration is increased. Use of felling wastes is improved.

More intensive method of silvicultural operations are introduced that results in improvement of structure and productivity of the stands. Production of woody biomass is optimized as well as products usage. Forest nursery management is considerable improved. Modern technologies for prevention, detection, monitoring and extinguishing of forest fires are introduced.

Development of system of scientifically based silvicultural operations and technologies ensures conservation of biological and landscape biodiversity, and forest protective functions.

Activities implemented within the project are effective for the development of forestry of the Republic of Belarus at current stage.

All the changes made in the process of the project implementation (see section above) facilitated more effective and target-oriented project implementation.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Outcome 1: To enhance silvicultural management and reforestation and afforestation in targeted forest areas.

74. The outcome 1 is fully achieved. The silvicultural management, reforestation and afforestation practices are considerable improved. This is done due to the implementation of the activities below. Mentioned results would be not possible without the project and much more time would be need for the country to reach the level of silvicultural management as it was reached by the end of the project:
    - Increase of intensity of silvicultural operations due to the improvement of system and approach to intermediate fellings in the young and middle-aged forests that result in improvement of structure and productivity of the stands. This became possible due to the delivery of 183 harvesters and forwarders to forest enterprises, all the regions of the country. New harvesters simplify and increase effectiveness of work. The new machinery is more maneuver, and the size allow moving between the stands that ensure less damage to the forests in the process of work. The capacity of new machinery is higher. One harvester can harvest 30 to 50 cubic meters of

timber, e.g around 1,5 hectares per shift. Due to usage of the modern machinery, the share of the intermediate fellings will make 30% until the end of 2021. Optimal volume of timber harvesting in the process of intermediate felllings to ensure productivity of the left stands, 35 cubic meters per hectare, is also achieved due to usage of the new machinery.

- Increase of capacities on production of seedlings with closed root system. 4 forest nurseries were established for production of planting materials with closed root system. As of now, 25,1 mln. seedlings with closed root system are already produced. This indicator even high that was initially planned (23.7 mln. seedlings), in spite of establishment on 4 forest nurseries instead of 6 as was initially planned. This is mainly because the cassettes of type FD 64 and FD100 having more planting places and capacities. Usage of planting material will closed root system will ensure creation of economically valuable forest stand in Belarus and export of the planting material in mid-term. As of now, more than 6 thnd.ha of forest cultures were created using the produced planting material with the closed root system. It is planned that around 20% of forest cultures in Belarus will be created using high quality planting material in the coming years. Consequently, carbon sequestration volume for the planting material makes now 6,095,032 Metric tons, which is even larger than initially planned (5,245,627 Metric tons). This is also achieved due to increase of amount of seedlings produced in 4 forest nurseries.
- Improvement of labor safety conditions for the forest staff working in forest nurseries. This is done through procurement and delivery to 78 forest enterprises having small-size forest nurseries protective sets and sprinklers for treatment with chemical compounds against weeds, for spraying compounds protecting the plants against pests, and for feeding of the plants and granulated fertilizers.
- Improvement of forest fire fighting and management capacities. This is done through procurement, delivery and usage by 45 forest enterprises off-road fire trucks (42 units) and utility vehicles for forest protection service (31 units). Thus, 10% of all the fire fighting machinery available in the forest enterprises was procured using the project funds. The machinery allowed for prompt delivery of the water and firefighting crews of forest enterprises to the fires in the forest stands, and facilitated extinguishing of fires in the minimum shortest time.

  Equipment for testing and repair of fire hoses as well as utility vehicle for transportation of the workers were procured for the Enterprise “Bellesozashchita”, which ensures technical maintenance of fire hoses in the forest enterprises of the sector before the start of top fire season and, consequently, improves preparedness of the forest protection service to the fire fighting.

  Inventory of dried peatlands and those inefficiently used in agriculture and for industry purposes, which were transferred to the forest fund, was done. Analysis of fire preventive measures for each peatland was made. Schemes of organization of territory to minimize risk of fires for each peatland were developed (activity 2.3.. Annex 6).
- Improvement of capacity of liquidation of consequences of emergency situations. This is achieved through procurement and usage of 12 harvester and forwarders to ensure prompt and effective respond to the emergency situation happened in the forests of the Republic of Belarus in result of hurricane winds in June-July 2016.

- Training of forest manpower on work with new equipment. Regular practical trainings on timber harvesting using multi-operational machinery of new generation are held at the Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector of the Ministry of Forestry. In 2018-2021, 405 specialists of the forest sector were trained.
- Improvement of institutional capacity in the field of selection. This was done due to creation of *ex situ* collection of forms of forest plants resistant to climate stress and representing rare and economically valuable tree species. The collections was established on the area of 3.05 ha. 1214 seedlings and saplings of more than 35 coniferous and deciduous wood species and their varieties were planted. The *ex situ* collection is highly practically oriented product ensuring production of biologically sustainable and economically valuable planting materials. It is also of high scientific importance as it ensures production of initial material for experimental selection and genetic works (activity 1.3.3, Annex 6).

  Policy in the field of forest fire zoning was updated. Amendments to the Technical code of common practice "Rules of firefighting arrangement of forests of the Republic of Belarus" were developed and approved by the Order of the Ministry of Forestry as of 28.04.2017 No.9. Map of forest fire zoning of the territory of Belarus was actualized (activity 2.1., Annex 6).

  Awareness-raising of civic society on prevention of forest fires. Video was produced to draw attention to the problems of forest fires. During the fire dangerous seasons in 2019-2020, the video was broadcasted at the TV channels in prime time, in internet, in the cinemas in all the regional centers, in Minsk metro, and at Minsk bus station "Centralny". During this time, about 2 million people were able to see the video (activity 2.2.2, Annex 6). The link is:
  https://www.youtube.com/watch?v=8ebtF1ebBW4&t=2s

Outcome 2: To increase the use of felling residues in targeted forest areas.

75. The outcome 2 is fully achieved. System and approach to usage of the felling residues in the targeted areas are improved. This is achieved due to implementation of the following activities:
    - Expansion of use of felling wastes for energetic purposes. This is achieved through procurement and usage of 2 chopping portable machines, which process timber into the chips. This technology reduces fires risks because of the felling wastes left in the forests. Usage of felling wastes also result in additional carbon advantages due to increased use of woody biofuel for energetic purposes.
    - Improvement of institutional framework on treatment with felling wastes. International experience of Canada, Finland, Sweden, Germany and Russia on treatment of felling wastes after commercial feelings was studied. Methodology of assessment of carbon sequestration by the felling wastes in the process of commercial cuts (clear, non-clear) was prepared. Recommendations and complex of actions on biodiversity protection, optimum content of nutrients and minimization of carbon dioxide emissions at the sites after clear and non-clear commercial cuts, and on treatment with felling wastes upon results of monitoring, with due regard to the balance of social, ecological and consumption interests of forest use were also developed. Amendments and additions to the State Standard STB 1360-2002

"Sustainable Forest Management and Forest Use. Commercial Fellings. Requirements to the Technologies" were prepared and are related to the treatment of felling wastes. Methodology for assessment of carbon sequestration by felling wastes in the process of intermediate cuts by the main forest species was developed. Total storage of carbon by the whole phytomass of the stands is defined as sum of carbon storage by the concrete pool: timber of the trunk, branches and knots, needles (leaves), and roots. Proposals with justification of social and ecological, and economic factors for removal/ non-removal of felling wastes in the process of thinnings and cut-through fellings were developed. The proposals were elaborated to ensure that absorption of carbon dioxide by the forest stands of Republic of Belarus in the forests of the main tree species is not reduced (activities 3.1.3.3 and 3.1.8, Annex 6).

Outcome 3: To improve the public good contribution from forests in targeted forest areas.

76. The outcome 3 is fully achieved. The public good contribution from forests in targeted forest areas is improved. This was reached due to implementation of the activities described below. It should be mentioned that due to the input of the project, new innovative practices and methods were introduced into the practice of forestry management that enhance forest ecosystem services. Institutional framework for functioning of forestry sector was considerable strengthened to embed the new attitudes and approaches to sustainable forest management:

- Actualization and development of national institutional forest framework. A lot of technical, normative, legislation and other regulatory documents were developed and approved stipulating introduction of new practices and approached with due regard to necessity of biological and landscape conservation, estimation of forest ecosystem services, introduction of "green economy" principles, etc., and namely:
    i. New version of Regulations on organization of forest monitoring and usage of monitoring data was developed and approved by the Resolution of the Government as of 04.11.2016 No. 907 (activity 3.1.1.2., sub-task "Improving the system of forest monitoring in the Republic of Belarus", Annex 6).
    ii. State program "Belarusian Forest" for 2021-2025 was developed and approved by the Resolution of the Government as of 28.01.2021 No.52 (activity 3.1.1.1, Annex 6).
    iii. Rules for the control of radioactive contamination in the system of the Ministry of Forestry were amended and approved by the Order of the Ministry of Forestry as of 03.02.2017 No. 36. Rules for forestry organization at the territories contaminated in the result of Chernobyl accident were developed and approved by the Resolution of the Ministry of Forestry as of 27 December 2016 No.86. Amendment No. 1 to the Technical code of common practice 240-2010 "Exploration of lands of forest fund" was developed and approved by the Resolution of Ministry of Forestry as of 24.10.2016 No. 24 and is valid from 01.04. 2017. Amendment No. 2 to the Technical code of common practice 239-2010 «Exploration of forest felling sites" was developed and approved by the Resolution of the Ministry of Forestry as of 4.11.2016 No. 29 and is valid from 01.04. 2017. The latter two mentioned technical normative documents stipulate requirements to the

forestry management in the radioactive contaminated zones (activity 3.4, Annex 6).

iv. New version of the following State standards of Belarus (hereinafter- "STB") were developed: STB 1708 "Sustainable forest management and forest use. Basic requirements"; STB "Group certification of forest management and forest use systems. Requirements"; STB 2157–2016 (PEFC ST 2002:2013) "Identification of timber and non-timber forest products upon origin. Basic requirements" (activity 3.1.1.3, Annex 6).

v. Strategy and Action Plan on adaptation of Belarusian forestry to the climate change, increase of greenhouse gases absorption, and introduction of "green economy" principles were developed and approved at the session of the Scientific and Technical council of the Ministry of Forestry as of 28.06.2019 No. 4 (activity 3.1.4, Annex 6).

vi. The following methodical documents were also developed envisaging introduction of new innovative practices: Methodical document on reconstruction of low value forest stands to increase share of broad-leaved forests; Recommendations on reforestation of felling sites of dried spruce and pine forest stands" (activities 3.1.5 and 3.1.6, Annex 6).

- Capacity building of the forestry manpower. 63 specialists of forestry sector, environmental sector and other stakeholders learned best practices of forestry management at 6 study tours to European countries. 3448 specialists of forest sector were trained on new approaches, practices and technologies on the basis of the Republican Centre for Improvement of Skills of the Manager and Specialists of Forestry Sector (including those trained to work with new harvesters and forwarders). This number of trained specialists include 157 women. Another 1700 people were trained through participating the workshops, trainings, other events held in the process of researches, development of new legislative documents, etc.
- Establishment of new "green" jobs. 72 new jobs were established in relation to creation of new forest nurseries, and 195 new jobs were created due to delivery and usage of new forest harvesting equipment.
- Improvement of forestry education. 11 new educational programs are developed covering new practices and approaches. Since 2021, the programs are included into educational process of the Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector of the Ministry of Forestry. This ensures project sustainability in long run through training of "new generation" forestry staff on permanent basis (activity 3.3.1, Annex 6).
- Improvement of methods of forest monitoring. Remotely piloted aerial vehicle was procured for the Unitary Enterprise "Belgosles, which is used to: monitor over the conditions of the forest fund; monitor organization of forest protective measures; and monitor over the fires, in order to have real-time data. Proposals on improvement of forest monitoring system in the Republic of Belarus to ensure minimization of negative impact of the changing climatic conditions and economic activities at the forests were prepared (activity 3.1.3.1, Annex 6).
- Improvement of the forest management planning system. A lot was done within the project to change current forest management planning system and to introduce new modern approaches. Analysis of effectiveness of the current system of forest

management planning in the Republic of Belarus as well as analysis of possibilities of development of market for forest management and planning services were done. New approaches on assessment of climatic changes influencing the structure and conditions of forests in the course of forest management with the purpose to create sustainable and productive forests with conservation of biodiversity were developed. Testing of usage of the remotely piloted aerial vehicles in the process of forest inventory, and development of technology of processing of data received from the remotely piloted aerial vehicles was ensured. Usage of new approach to the development of forest management plans taking into consideration biodiversity conservation function of the forests was piloted (activity 3.1.1.2., sub-task "Improvement of the forest management planning system in the Republic of Belarus", Annex 6).

- Automation and computerizing to enhance forestry management and access to the data:
    i. Two new software, "Nursery management" and "Seed management of forest stands", were developed. Due to the new software, all the documents are filled in electronically, and all the aggregated documents and reports are generated electronically with further transformation in Word format and printing on paper (activity 1.3.4, Annex 6).
    ii. New software (information management system) "Reforestation" was developed to ensure improvement of effectiveness of reforestation and afforestation, automation of planning process, and exclusion of errors in the process of integration of reporting documentation (activity 3.2.1.1, Annex 6).
    iii. Geoinformation service "RadForInfo" (software) was developed. Usage of "RadForInfo" facilitates prompt decision-making on forest use (forest fellings) in radioactive contaminated zones, and first of all, with high density of soil contamination with 137Cs (hereinafter- contamination density) from 15 till 40 Ci/ km2 (III zone) (activity 3.4.1, Annex 6).
    iv. Software "LesInfo" consisting of the sub-systems of input, storage, and provision of forest management information, spatial analysis of data with possibility of demonstration of graphical pictures (public maps OSM, Google Maps and own maps), and creation of own information layers related to the forest fund is developed (activity 3.2.1, Annex 6).
- Awareness-raising of public and stakeholders on forestry-related topics. Film with the project results and 8 social videos were produced. The videos cover the following topics: main achievements in reforestation and forest production; function of new forest seed centers; forest contamination management; forest fire management; people working in the forests; professional orientation of children; school forestry units. These videos are planned for broadcasting at the TV channels and in internet.

C. OTHER OUTCOMES AND IMPACTS

Gender

77. The project facilitated further empowerment of the women, and increase of the income of the women of forestry sector. Share of women in the total amount of people working in the forest sector makes 17.7%. Taking into account all the effects in the result of the project implementation in short-term, mid-term and long-term perspectives, it can be said that conditions of the labor and possibilities for further economic growth and increase of income are crated for 6812 women (17.7% our of 38 487 people, workers of forest sector).

    72 new jobs were established in all the regions of the country due to new forest nurseries. 70% of the jobs are occupied by the women. Women and men have equal rights in relation to the payment for the job done.

78. Good opportunities are established for forest professional growth of the women through participation in the trainings, including on the basis of 11 new programs developed within the project. 157 women underwent training on the basis of the Republican Centre for improvement of Skills of the Managers and Specialists of Forestry sector during the project implementation.

    1700 people were trained on new practices, approaches and technologies at the roundtables and workshops of the project, including 490 women. New knowledge and capacities ensure possibility of getting decent job and improvement of well-being of the women.

Institutional Strengthening

79. Project implementation facilitated development of institutional framework for function of the forestry sector in the country. All developed normative, technical and legislative documents ensure introduction of new methods, innovative practices and approaches, changing of people attitude to the forests and their value, biodiversity and landscape conservation, proper understanding of forest ecosystem functions, etc. These changes relate not only to the forest sector, but are also related to nature protection sector and facilitate implementation of the country's obligations on reduction of greenhouse gas emissions, etc.

    Legislation was improved as well as normative and legislative basis within the project and in order to implement Forestry Development Strategic Plan for the period from 2015 until 2030. New methods and technologies on forest monitoring, and forest management planning and forest inventory were developed. Forest fire zoning was actualized. New methods of control over forest radioactive contamination were elaborated.

80. Project implementation contributed to actual realization of the Schedule of exploration of forest sites on conformity to the criteria related to nature protection territories, which was approved on 29.04.2016. Territories of 6 forest enterprises (Klichevskij, Glubokskij, Tolochinskij, Bogushevskij forest enterprises, and Vetkovskij and Narovlyanskij special forest enterprises) were examined. Forest sites, which are subject to special protection, were identified. Forest management plans with due regard to new norms of the Forest Code on biodiversity protection were approved. New developed forest management plans for the mentioned 6 forest enterprises include the sections with due regard to the protection of biodiversity at the studied territories (activities 3.1.7 and 3.1.1.3, Annex 6).

81. The project also assisted with clear understanding of input of the forestry sector into achievement of SDGs. Current national indices for achievement of the SDG 15 "Protect,

restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss" were analyzed. Indicators of achievement of national indices related to the forestry sector were developed. Indicators of achievement of 6 global goals on the forests and 26 related tasks of the United Nations Strategic Plan for Forests 2017-2030 were elaborated. Recommendations on reporting on input of Belarusian forests into achievement of global goals were prepared (activity 3.1.1.1, Annex 6).

82. State program "Belarusian Forest" for 2021- 2025 was developed and approved by the Government (Decree of the Council of Ministers of the Republic of Belarus dated 28.01.2021 No.52) with the project support. The program is prepared with due regard to the indicators of Sustainable Development Goals. Proposals for improvement of normative, legislative and technical framework of forestry management with the account of new version of Forest Code were developed. The proposals cover such issues as forestry adaptation to the climate change, biodiversity conservation, creation of high productive forest stands, and effective usage of forest resources.

83. A lot of attention was put within the project to enhancing computerization and digitalization that lead the forest sector to the new level of the obtaining, storage and use of data. Special software for the forest sector were developed, and the process were automated the following fields: forest monitoring; forest seed and nursery management; reforestation; radioactive monitoring of the forest fund; improvement of analysis of forest inventory information.

84. Capacity of the forest sector manpower was considerably strengthened through training on new methods and technologies developed within the project. 1700 people took part in the trainings and workshops held within the project. All the recommendations on amendments to the normative documents were discussed at the trainings and workshops with participation of the staff of forest enterprises, specialists of research institutions and civic society. 405 workers of forest sector were trained to work with new forest harvesting machinery. All this will result in having specialists of forest sector of "new generation", with deep professional capacities with due regard to the modern international approaches in the field of forestry.

Mobilizing Private Sector Financing

85. Private sector was not direct beneficiary of the project. However, conditions for enhancing of capacity of private business were created with the support of the project. Thus, during the project implementation private sector organizations were involved a lot, including construction companies, suppliers of equipment and machinery for the forest enterprises. More than 20 companies of private sector delivered equipment, machinery and provided services within the project. List of all suppliers of equipment, works and services is given in Annex 4 to this report. Involvement of private sector in the delivery of equipment in forestry sector expanded the borders for private business in Belarus and contributed to further development of market of works and services particularly in forestry sector. From the other side, having experience of operating in the forest sector, private business of Belarus can access markets of the other countries.

86. Analysis of possibility of development of market of forest management and planning services was done within the project. Possibility of involvement of private sector into the field of forest management and planning services was evaluated that in long run can result in establishment of real competitive market of services on forest management and planning.

87. Development of 11 new training programs and lectures with their introduction into educational process since Autumn 2021 will definitely contribute to improvement of knowledge, capacities and potential of private business on forestry-related topics. This will lead to further function of business in the forest sector and access to the markets in the field of forest sectors in other countries, mainly neighboring ones.

Organization of courses on training of operators of harvesters and forwarders at the Republican Centre for Improvement of Skills of the Managers and Specialists of Forestry Sector provides opportunities for the private sector to be trained and gain new capacities to work with modern and highly productive machinery, that will result in involvement of private business in the sector of forest harvesting services.

Poverty Reduction and Shared Prosperity

88. 267 new jobs were established due to the project, including 72 new jobs related to new forest nurseries (mainly for women) and 195 jobs for operators of harvesters and forwarders.
89. Profit of forest enterprises increased considerably during the project implementation period that result in increase of salaries for the staff of forest enterprises and well-being of forestry manpower and private business in the forest sector. Amount of net profit of forest enterprises increased by USD 46.6 mln. by 2021 in comparison with the baseline year 2015. The last years prices of timber at international markets increased in 2 times that is good evidence of stable demand on products of forest sector in the future. It is becoming more and more prestigious to work in the forest enterprises, and in some districts of Belarus forest enterprises are among the biggest local taxpayers. Qualified specialists come to work in forest enterprises and try to stay there and work in the enterprises for a long time.
90. Introduction of 11 new training programs into educational process at the Republican Centre for Improvement of Skills of the Managers and Specialists of Forestry Sector as well as courses on training of operators of harvesters and forwarders (due to procurement of special simulators) allow training of forest sector specialists of new generation, annually since Autumn 2021. Due to new knowledge and capacities, these specialists can get better-paid jobs demanded at rural areas.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

91. At the preparation stage the project was designed in a way combining actualization of legislative framework of the forestry sector, research works, trainings of the broad range of specialists of forest sector and procurement of innovative equipment. All this facilitated combination of practical orientation of the project with introduction of new approaches and practices.
92. The project was designed correctly and thoughtfully. Due to the project design, all the activities as well as a number of additional ones were implemented.

93. There is no separately developed document with monitoring plan. Monitoring over the project implementation was made as per the rules and procedures of the World Bank. It should be noted that thorough monitoring over the project implementation under the main project directions was ensured: more than 10 World Bank missions were held for the whole implementation period to assess all the aspects of the project implementation; 1-2 times per year financial monitoring was held; and 1-2 times per year procurements were verified. All this allowed to avoid mistakes and discrepancies in the process of the project implementation, and contributed to timely revise project implementation strategy.
94. Project Results Framework was developed and was adequate for the whole period of the project implementation. Good evidence of this is the fact that indicators of the Results Framework were relevant during the whole period of project implementation.
95. At the same time it should be stated that project outputs and outcomes by components that need to be achieved by the time of the project completion were not clearly identified at the time of the project preparation. These results were formulated at the later stages of the project implementation.

B. KEY FACTORS DURING IMPLEMENTATION

Factors impeding project implementation:

96. At the initial stage, one of the challenges affecting smooth project implementation was limited amount of national specialists having experience in implementation of international projects and grants in the forest sector. To overcome this, experienced specialists in implementation of international projects were engaged for training of the staff of project implementation unit and for specifics tasks like, for example, development of terms of references within the project activities.
97. At the first stage of the project implementation, a lot of time was needed for development of documents and preparation of tender dossiers in line with the Procurement rules of the World Bank. However, once the staff of the project implementation unit (hereinafter- PIU) have been trained in the International Training Center (Turin, Italy), procurement process was speeded up and all the contracts for construction works and for delivery of equipment were concluded and duly completed.
98. Pandemics caused by **COVID- 19.** In 2020 pandemics caused by COVID-19 started. From the start of the pandemics, Ministry of Forestry and PIU did all the actions to ensure project implementation at due level, including:

- all the measures on preventing of COVID-19 infection were taken, including those recommended by the Ministry of Health of the Republic of Belarus. At all the construction sites the works were carried out following requirements on distancing and obligatory wearing of masks (sanitizers, masks and gloves were procured);
- changes to the project implementation process were promptly incorporated, and remote methods of cooperation with all the project beneficiaries and partners were introduced;
- innovative methods and practices of implementation of some project activities were used. For example, to ensure control and further information support to the results of

construction of forest nursery in Mogilev r forest enterprises, shooting was made by the staff of the forest enterprise using drone.

- project activities were promptly revised and the project funds were re-programmed.

All the actions taken allowed not to suspend project implementation work, and on contrary to accomplish all the planned activities in time or with a small delay, and to train staff of forest enterprises on new methods of works.

Considering epidemiological situation, World Ban missions were organized in remote format that ensured involvement even more stakeholders and contributed to the achievement of the project goals fully and timely.

Factors facilitating project implementation:

99. Good coordination of the project. Ministry of Forestry ensured effective coordination over the project implementation. Draft terms of references, contracts for services and delivery of goods were promptly considered and approved. Meetings of the appraisal tendering panels were organized timely as well as meetings of the Steering Committee related to assessment of the project implementation progress and reports under the contracts.
100. Partnership established within the project. In the process of the project implementation, Ministry of Forestry tightly cooperated with the Ministry of Natural Resources and Environmental Protection. Appropriate terms of references were sent to the Ministry of Natural Resources and Environmental Protection for agreement and were finalized upon comments of this Ministry. Representatives of the Natural Resources and Environmental Protection took part in all the meetings of the Steering Committee. Good partnership was built with the all other key stakeholders, including Ministry of Economy, National Academy of Sciences of Belarus, Belarusian State Technological University, suppliers of equipment, sub-contractors and forest enterprises.
101. Usage of multiletaral contracts. Practice of conclusion of four-parties contracts was used, where the parties of the contracts included: Ministry of Forestry (Client), Unitary Enterprise "Bellesexport" (representative of the Client), Supplier and Buyer (forest enterprise). This allowed direct delivery of the equipment to the forest enterprises, with further putting it on balance of the enterprises, putting it into exploitation and usage in the production process without delays.
102. Good developed legislation of Belarus in the field of forestry facilitated effective project implementation. In Belarus there are a lot of different legislative and technical normative legal documents regulating various issues in the forest sector. Legislation is modified on regular basis to follow international processes and requirements. All this allowed further changes to different legislative documents and to introduce new innovative methods and approaches with the project support.
103. State property on the forests and unified forestry management. Centralized management over the forestry sector by the Ministry of Forestry, which appropriate state governmental body, contributes to deployment of the best and innovative practices and methods all over the country, to carry out one common policy in the field of forestry management, including such vital directions as: firefighting, forest pest management, fellings in the drying stands, improvement of practice of handling with the radionuclide contaminated products.

104. Existence of the Republican Centre for Improvement of Skills of the Managers and Specialists of the Forestry Sector in the structure of the Ministry of Forestry. This resulted in introduction of courses on training of operators of harvesters and forwarders, and 11 new training programs developed within the project, and start training of forest specialists ensuring by this availability of high-qualified specialists having skills to work with modern machinery.
105. Establishment and function of the Steering Committee of the project. Steering Committee of the project was created in June 2015 to ensure coordination of the work within activities funded using GEF Grant funds. 15 meetings of the Steering Committee were organized in total. Around 20 people were members of the Committee and represent 8 organizations, including state governmental bodies, civic society organizations, educational institutions, etc. Consideration of the project results at the Steering Committee meetings contributed to prompt deciding on re-distribution of the Grant funds, review all the results within the activities funded using GEF Grant funds. Function of the Steering Committee ensured transparency of the project results and building partnership and networking.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

Monitoring & Evaluation Design

106. A set of indicators measuring the project results were identified in the Project Appraisal Document (PAD). According to PAD, PIU, Unitary Enterprise "Bellesexport" was responsible for collection of the appropriate data to follow the indicators. All the indicators were included into Results Framework and Monitoring. The Framework should be updated twice a year, as part of the progress report. The PIU was also responsible for preparation progress report, twice a year, except the first year of implementation, as of January and July. Another monitoring tools used during the project implementation were control checks of the World Bank over finances and procurements and World Bank monitoring visits.
107. The Results Framework and Monitoring has 4 PDOs indicators, 1 Global Environmental Objective Indicator, and 11 Intermediate Results Indicators. The indicators are measurable, achievable, realistic and remained relevant during the whole period of the project implementation. All the indicators were achieved accept one. Intermediate Result Indicator "Nursery lines for container grown seedlings of native tree species established" was not fully achieved in relation to the amount of the nursery lines. 4 lines instead of 6 were procured and installed (see section on changes to the project). However, in spite of this amount of the lines, of seedlings actually produced by 4 nursery lines is even more and equal to 25.1 mln. pieces instead of 23.7 mln. pieces initially planned to be produced by 6 lines as per the Results Framework. This means that the project result in improvement of production of high productive planting material is fully achieved.

    However, the proposed indicators in the Results Framework are not clearly connected to the project outputs and outcomes. More clearly definition of the project outputs and outcomes and their connection with indicators would be more helpful and improve communication to the stakeholders.

M&E Implementation

108. PIU regularly measured the indicators included in the Results Framework and reported to the World Bank on implementation status twice a year as part of progress report. PIU was responsible for collection of appropriate data mainly from the key partners and stakeholders where it was relevant.

    Financial and procurement controls were organized by the World Bank 1-2 times year, with preparation and sharing of appropriate reports upon completion of the controls.

    More than 10 World Bank missions were held during the entire period of the project implementation, which played important role in proper changing and revision of the project activities when it was required.

    Another effective monitoring tool that was actually used during the project implementation is establishment and function of the project Steering Committee. The Committee was created mainly to consider results of the activities funded by GEF Grant funds. This was very useful and facilitated coordination of the activities, building partnership, and achievement of the project results.

109. The M&E functions and processes are likely to be sustained after the project closure because most of the indicators are directly connected with the production activities of the forest enterprises. The data will be further collected to assess the effectiveness of the work and other impacts in the result of the operations (e.g. amount of carbon sequestrated, etc.). As will be required, Ministry of Forestry will define organizations in its structure that are responsible for updating and summarizing of this information.

110. One more monitoring tool over implementation of the activities of GEF Grant was used at the national level in accordance with the requirements of the Belarusian legislation. This is complex expertise of the international projects, which was held three times during the project implementation period, in the years 2016, 2018, and 2021. The expertise was organized by the Ministry of Economy of the Republic of Belarus, Ministry on Taxation, Ministry of Natural Resources and Environmental protection, Ministry of Forestry, and State Customs Committee. Project results, effectiveness, quality of performance of PIU, the World bank, the Ministry of Forestry, and all other aspects of the project were analyzed. High ratings were given to the project during each of the expertise. This evidences on high demand in the project results and its effectiveness at the national level.

M&E Utilization

111. M&E data on performance and results progress were used for management and decision making for the whole duration of project implementation. The data was used for adjusting the project activities when it was necessary. The data was used by the Ministry of Forestry for making decision on additional activities to be held within the project in relation to the research work and improvement of institutional capacities. However, indicators were formulated to demonstrate achievement at output levels and did not require evidence at the outcome level or even forecasted impact of the project that makes the overall picture about the project not full.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

Safeguards (environmental and social)

112. As per Institutional data section of PAD, the project Practice Area was defined ad "Environment & Natural Resources" and "Climate Change" was identified as Cross Cutting Area. The Major Sector is "Agriculture, fishing, and forestry". Results Framework and Monitoring included one specific Global Environmental Objective Indicators, which is "Amount of carbon sequestered". In the process of the project implementation environmental benefits were achieved as planned. All the activities, even in case of revision, were targeted at achievement of environmental benefits.
113. As for the social benefits, 267 new jobs were established due to the project, including 72 new jobs related to new forest nurseries and 195 jobs for operators of harvesters and forwarders, thus providing improvement for social well-being and income for the local people. 70% of new 72 jobs related to the newly established forest nurseries are occupied by the women. Pursuant to the legislation of the Republic of Belarus, the jobs of the operators of harvesters and forwarders cab be occupied only by men because this job is considered to the heavy and traumatic.
114. 1700 people were trained in the course of the workshops and roundtables held within the projects, including 490 women. The people increased their skills and capacities, and thus have more opportunities for better jobs in the future.
115. 11 new training programs and lectures were developed and introduced into the system of improvement of skills of forestry sector since Autumn 2021 and special courses on training of operators of harvesters and forwarders. All this provide opportunities for the people for improvement their knowledge and professional growth, which is especially important for the rural areas.
116. National Action Plan on Introduction of "Green Economy" Principles into the Forestry of the Republic of Belarus up to 2030 was prepared within the project. "Green economy" concept provides for environmental benefits, economic benefits and social ones. In the conditions of "green economy", forestry sector will ensure maximum input into improvement of level of people's well-being through production of timber and non-timber products and services and creation of possibilities for income. At the same time, potential of forests as source of ecosystems services is being supported and developed on sustained basis with due regard to the climate change.

Financial Management

117. Good financial management arrangements at the national level were ensured by "Bellesexport", on the basis of which PIU was established. In spite of the fact that fiduciary risk was rated as "Substantial" in the PAD, proper financial control and management were organized during the project implementation, including accounting, budgeting, organization and staffing, internal controls, audit, and financial reporting. Planning and budgeting were done in accordance with the Procurement Plans, PAD, decisions of the project Steering Committee. Progress reports for the World Bank, including financial data, were prepared twice a year, except for the first year of the project implementation. In addition, every quarter since 2015 financial reports on usage of the funds by each funding source (Main Loan, Additional Loan (from 2018) and GEF Grant) were prepared and submitted to the World

Bank and since 2020 are uploaded to the program of the World Bank "Client Connection" for further check of the financial specialists of the Bank. PIU was good staffed with the specialists with the required financial skills to support the project.

118. As per the national legislation, accounting rules were strictly followed ensuring adequate internal control for the project, including regular reconciliation of bank accounts on weekly basis, adequate segregation of duties, proper accounting policies and procedures, and monthly reconciliation of disbursement summaries with accounting records. The budgets were entered in the accounting software, and estimated cost and actual cost of each activity were properly analyzed. To avoid mixture of the project funds with the other finances, 3 special project-related accounts were opened by the "Bellesexport", including one account in USD, one account in EUR and one account specifically for GEF Grant funds. Before actual transaction of the funds, each payment order needed to be revised and approved at three levels inside "Bellesexport". Audits were carried out every FY 2016-2021 by the company included into licensed list of the audit companies of the World Bank to work in Belarus, with no substantial issues ever raised. The auditors issued an unmodified (clean) opinion on the project financial statements. The auditors did not find any cases of accounting problems and internal control deficiencies to report. Co-financing of the Belarusian counterparts was not envisaged from the very beginning of the project.
119. 6 financial controls were held by the World Bank, on annual basis in FY 2016-2021. The controls covered disbursement of funds in the reporting period, organization of financial management. Upon results of the control, reports were prepared by the World Bank. No any substantial issues were ever found during the controls.
120. Financial specialists of "Bellesexport" were trained on financial management, project completion procedures, particularly on financial management and disbursements, by the World Bank fiduciary team.

Procurement

121. Procurements within the project were done in line with the World Bank rules and procedures and in line with the Operational Manual BFDP, which was approved in 2015 and revised accordingly in 2016, 2017, 2018, and 2021. All the procurements were also listed in Procurement plan of the project, which was developed in 2015 and revised as was necessary in line with the changes to the project implementation. Since 2018 all the project procurements are uploaded to the World Bank system STEP.
122. All the procurements of equipment, machinery, works and services were done, and contracts duly completed by the end of the project. List of the concluded contracts from all the funding sources of the project is given in Annex 4. However, there were some difficulties in the process of procurements. 16 biddings were re-announced, and some of them more than two times. The reasons of the re-announcement are:
    - Noncompliance of the bids of the bidders with the requirements of the bidding documents;
    - Impossibility to produce and deliver of equipment in the required time;
    - Noncompliance of the proposed equipment and goods with the requirements of the technical specifications;

- Considerable exceeding of the price of the proposed goods in comparison with the planned budget.

The difficulties have been overcome and did not influence at the achievement of the PDO at the end.

123. "Bellesexport" was good staffed with the specialists of the required skills and qualifications in the field of procurement. PIU specialists underwent training on management of procurement of works and consultant services, and contracts management in the International Training Centre (Turin, Italy).

124. In 2016 decision was taken by the Belarusian Government to exempt 148 forwarders and harvesters that were delivered to Belarus from Sweden for 87 forest enterprises from custom duties and value added tax. These both taxes make around 30% of the cost of the equipment. Therefore, considerable amount of funds were saved and were re-distributed for the other project activities in line with the project goals.

Disbursement

125. No issues related to the disbursement can be mentioned. All the disbursements were done properly and in time. There were no any delays in transferring of the funds. No ineligible expenditures were ever found.

C. BANK PERFORMANCE

Quality at Entry (i.e. preparation, project design)

126. At the stage of the project preparation, the World Bank managed to attract additional funding from GEF, which contributed a lot to the development of forestry sector of Belarus. The project was well aligned with the World Bank's key strategy documents and international processes at the time of appraisal. The project activities were selected adequately and were relevant and realistic for the entire period of the project implementation. The changes that were made added value to the project results, but did not change the main direction of the project. The project components and activities responded to the needs of the national priorities, local entities and the PDO. Good technical support was proposed by the World Bank from the very beginning of the project implementation. This is also due to the presence of the mission of the World Bank in the country. Results of the first Forestry Development Project completed in 2002 were analyzed in the process of appraisal of BFDP. 3 thematic components reflecting the needs of the Belarusian forestry were included into the project, including on improving of silviculture and the sustainability of forest management, improving forest fire prevention, forest monitoring, and building capacity for future development of the forest sector. On practice this was combination of procurement and delivery of equipment and machinery, supported by the research works, study and introduction of new practices and innovative approaches, and capacity building of the forest staff. This complex approach secures sustainability of the project results in long run.

Quality of Supervision (i.e. during implementation)

127. The World Bank provided regular support throughout the project implementation and covered all the main aspects such as financial management, organization of procurements, administrative procedures, reporting, project revision and completion. The World Bank team was properly staffed to ensure sound technical supervision. The World Bank organized implementation support missions twice a year since 2015 and provided recommendations summarized in detailed Aid Memoires. The World Bank Country Office also supported and assisted in the project implementation. From the very beginning and through the whole implementation period, the World Bank concentrated on achievement of PDOs, and environmental, economic and social benefits in short-term, mid-term and long-term. The World Bank responded to the demands of the Belarusian counterparts and made all the efforts to find appropriate ways and solutions to the proposed changes. There were no delays from the Bank in consideration of the results and making payments in accordance with the concluded contracts.
128. International World Bank team contributed to gaining new knowledge and skills to the local staff. One of the advantages of the World Bank team was the fact the Team Leader was Russian speaking. This significantly improved communicating to the project partners and stakeholders.
129. It is worth to note that even during the pandemics caused by COVID-19 started since 2020 the World Bank team remained proactive and continued permanent support and assistance using remote communication means. World Bank implementation support missions were held remotely that ensures smooth project implementation and achievement of proper outputs and outcomes.

D. RISK TO DEVELOPMENT OUTCOME

130. Sustainability of the results achieved seems to be rather high. It can be stated that the results will contribute to the effective work of the forestry sector, including in the field of the forest protection and conservation, timber production, development of manpower potential. Development of the forest sector lead to the increase of well-being of the rural population. New practices and approaches introduced within the project, such as "green economy", conservation of biodiversity in the process of the forest management, planning and use, understanding of the forest potential on carbon sequestration, proper attitude to the forest ecosystem functions, etc. will result in sustainable forest management and production in the long run.
131. Economic situation of the forest enterprises is rather strong and good by the end of the project. Profit of forest enterprises increased considerably during the project implementation period. Amount of net profit of forest enterprises increased by USD 46.6 mln. by 2021 in comparison with the baseline year 2015. The last years prices of timber at international markets increased in 2 times that is good evidence of stable demand on products of forest sector in the future. Almost all the forest enterprises are certified against two largest forest certification schemes in the world, PEFC and FSC. This is one more prerequisite for continuing of export of Belarusian timber and products. Starting from 2020 the forest enterprises started to repay the loan and use their own funds for this. The fact that the forest enterprises function rather stably ensures sustainability of the project results at different levels.

132. However, there is also financial risk that can be caused by the economic situation inside the country and abroad because of the pandemics, e.g. COVID-19, disasters, other force majeure situations, or other economic reasons. There is also risk of limitation of sale of Belarusian timber at international markets that can influence the forest enterprises, which are the main beneficiaries of the project. These risks are not predictable at this stage.

V. LESSONS AND RECOMMENDATIONS

133. Uniqueness of the project is the fact it is a combination of equipment investments and soft investments into new knowledge and new technologies. The purchase of the machinery for the intermediate fellings combined with the simulator training of operators of harvesters and forwarders ensured the high quality of work and prestige of the workers of the forest enterprises. Training on usage of the protective means for the plants and fertilizers was organized for the staff of newly constructed forest nurseries. Methodology of usage of the remotely piloted aerial vehicle in the forestry sector of Belarus was developed before actual purchase of the device. Organization of work in the forestry sector, mechanization of all the stages of treatment with the forest cultures, forest restoration with the planting material with the closed root system were raised at the new high level due to the project.
134. Application of multilateral contracts is good practice and facilitates effective usage of equipment and machinery by the end-users especially in case of the large infrastructural projects. As for BFDP, practice of conclusion of three-parties contracts in relation to the Loans and four-parties contracts in relation to the Grant was used, where the parties of the contracts included: Ministry of Forestry (Client), Unitary Enterprise "Bellesexport" (representative of the Client), Supplier and Buyer (forest enterprise). This allowed direct delivery of the equipment to the forest enterprises, with further putting it on balance of the enterprises, putting it into exploitation and usage in the production process without delay. Application of such mechanism is **recommended** for the similar infrastructural projects with big number of beneficiaries and end-users.
135. Well-built architecture of the project management by the World Bank ensured strong advising of the World Bank specialists on methodology and organization of procurement procedures, and financial issues. Due to effective management of the Bank, revisions to the project implementation process were made within delays, including during unprecedented epidemics caused by COVID-19. Usage of such management architecture by the World Bank **is recommended** for other infrastructural projects, which is especially vital for effective financial control and procurement organization, and particularly procurement of complex equipment.
136. Establishment of PIU in one of the organizations in the system of the Ministry of Forestry contributed to effective project implementation. From one side, PIU staff could raise and resolve all the issues directly with the Ministry of Forestry without delays. From the other side, after the project completion the trained PIU staff will keep working in the forest sector that will contribute to further dissemination of knowledge gained in the process of the project implementation and sustainability of the project results. Such practice can be **recommended** for implementation of similar complex sectoral projects with several donors.
137. Establishment of the project Steering Committee facilitated coordination of the project work with the key project partners, transparency of the project results, and allowed make prompt decisions on revision of the project implementation strategy. Moreover, this mechanism is

good control mechanism for the donor, and in case with BFDP this is GEF. Practice of creation and function of the Steering Committees can be **recommended** for all the World Bank loans, and not only in relation to the grant funds as the case with the Belarus Forestry Development Project.

138. While implementing such large infrastructural projects as BFDP partnership and networking should be built and ensured. This is key and vital factor as forestry issues are directly connected with nature protection issues, with findings in the field of science, with necessity of the simultaneous changes to the educational processes, etc. Thus, within BFDP tight collaboration was built and supported with the Ministry of Natural Resources and Environmental Protection, National Academy of Sciences of Belarus, Belarusian State Technological University, Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector, public organizations. All this led to complex results reached, including delivery of highly productive equipment, capacity building of the manpower of forest sector, strengthening of institutional framework of the forest sector and improvement of practices of silvicultural operations. However, it should be noted that not so much partners from the neighboring countries of Eastern and Western Europe were involved and took part in the project implementation. Partnership building and networking is **recommended** from the very first days of the implementation of large projects. This can be done through: involvement of the stakeholders in consideration of the project results; participation in the work of the Steering Committees; participation in the special *ad-hoc* expert groups; organization of joint events; etc.
139. Usage of the remote communication means like zoom, Microsoft teams, etc. turned to be effective tool to ensure engagement of broad range of partners and stakeholders locally and from abroad. Practice of use of the remote communication means **should be kept** as normal standard practice also after the end of the unprecedented pandemics caused by COVID-19.
140. Within the project the main emphasis in relation to the gender issues was made on training of women on new approaches and practices. During the entire project implementation period around 647 women were trained that makes 10% of the total number of women working in the forest sector. The women also received newly created within the project jobs. This is good result. However, within the project there were no activities targeted on improvement of accounting of demands of all gender groups in the process of the planning of forestry operations. **More attention should be given** to the gender issues and for the future more gender-related activities and research should be planned. This particularly relates to further women empowerment and taking into consideration the demands of different gender groups during planning of the whole complex of works in the forest sector.
141. Development of new information products within the project contributes to further digitalization of the forest sector. From the one hand, this reduces burden at the sectoral manpower. From the other hand this allows automation of the process on forest management and planning, reforestation, production of planting and seed material, forest monitoring, and monitoring over the level of radioactive contamination of the forest fund and timber. Process of the further digitalization and automation **should be continued** and ensure coverage of all the forestry enterprises of the country. Activities on development of new information products, automation and digitalization should be envisaged in other projects and initiatives. Training of appropriate staff to work with and to use new products is obligatory condition herewith.

ANNEX 1. Key Outputs of the Project

Objective/Outcome 1	*Outcome 1: To enhance silvicultural management and reforestation and afforestation in targeted forest areas/ achieved*
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. Intensity of silvicultural operations due to the improvement of system and approach to intermediate fellings in the young and middle-aged forests is increased. 100 harvesters, 83 forwarders and 12 pieces of equipment are procured and put into exploitation. 2. Capacities on production of seedlings with closed root system are established. 4 forest nurseries are built; 25,1 mln.seedlings with the closed root system are produced. 6 loaders, 176 pieces of equipment, 279 340 cassettes, 26 261 frameworks, 57 407 boxes are procured and put into exploitation. 3. Labor safety conditions for the forest staff working in forest nurseries are improved. 72 jobs have been created in new tree nurseries. 4. Forest fire fighting and management capacities are enhanced. 74 fire fighting trucks, 133 pieces of equipment are procured and put into exploitation. 5. Capacity of liquidation of consequences of emergency situations is improved. to intermediate fellings in the young and middle-aged forests is increased. 6 harvesters and 6 forwarders are procured and put into exploitation. 6. Abilities of forest manpower on work with new equipment are improved. Purchased 4 simulators for training harvester and forwarder operators. 7. Institutional framework in the field of seed management is developed. A program for automation of accounting in tree nurseries was developed and put into operation. 8. Awareness-raising of civic society on prevention of forest fires is strengthened. Social videos about fire fighting have been prepared.
Objective/Outcome 2	*Outcome 2: To increase the use of felling residues in targeted forest areas/achieved*
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. Use of felling wastes for energetic purposes is expanded. 2 pieces of equipment (chopping machines) are procured and put into exploitation. 2. Improvement of institutional framework on treatment with felling wastes is ensured. Reports under 2 GEF Grant activities are prepared. 149 specialists from all over the country are trained within 4 training workshops.
Objective/Outcome 2	*Outcome 3: To improve the public good contribution from forests in targeted forest areas/achieved*
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. National institutional forest framework is actualized and developed. 11 normative documents have been developed and approved. 2. Capacities of the forestry manpower are strengthened. 1,551 specialists are trained within 44 training workshops. 3. 267 new “green” jobs are established including for 50 women. 4. Forestry education is improved. 11 new employee training programs have been developed.

	5. Improvement of methods of forest monitoring is ensured. 6. Development of institutional framework in the field of forest management and planning system is developed. Purchased and put into operation 1 unit of equipment; 32 pieces of equipment. 7. Automation and computerizing to enhance forestry management and access to the data is ensured. 6 new information programs have been developed. 8. Awareness of public and stakeholders on forestry-related topics is increased. 9 social advertising videos and a film following the results of the Project were created.

ANNEX 2. List of Equipment Procured within the Project by Beneficiaries

Loan No. 8474-BY

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	**Forwarders** (type 1 - Vimek, type 2 - Amkodor)	**Loaders**	**Lifts**	**Plastic Boxes**	**Metal holders**	**Cassettes**	**Set of replacement equipment**	**Device for breaking bales of compressed peat**	**Mobile Wood Chippers**	**Equipment for mechanized cleaning of cutting areas**	**Forwarders Amkodor**	**Harvesters Amkodor,**	**Terrain vehicles designed to extinguish fires with water**	**Utility terrain vehicles wth a cargo platform**	**Terrain vehicles for forest fire protection**	**Video surveillance systems**
Brest State Production Forestry Association	**Baranovichy Forestry Enterprise**, type 1, 1 item	**Baranovichy Forestry Enterprise**, type 1, 1 item															
	Brest Forestry Enterprise, type 1, 2 items	**Brest Forestry Enterprise**, type 1, 2 items												**Brest Forestry Enterprise**, 1 item			
	Gantsevichy Foresrty Enterprise, type 1, 1 item	**Gantsevichy Foresrty Enterprise**, type 1, 1 item															
	Drogichyn Forestry Enterprise, type 1, 1 item	**Drogichyn Forestry Enterprise**, type 1, 1 item															
	Ivatsevichy Forestry Enterprise, type 1, 2 items	**Ivatsevichy Forestry Enterprise**, type 1, 2 items	**Ivatsevichy Forestry Enterprise**1 item		**Ivatsevichy Forestry Enterprise** 127items	**Ivatsevichy Forestry Enterprise**, 3000 items	**Ivatsevichy Forestry Enterprise**, 19600 items	**Ivatsevichy Forestry Enterprise**, 1 item	**Ivatsevichy Forestry Enterprise**, 1 item								
	Kobrin Experimental Forestry Enterprise, type 1, 1 item	**Kobrin Experimental Forestry Enterprise**, type 1, 1 item												**Kobrin Experimental Forestry Enterprise**, 1 item			
	Luninets Forestry Enterprise, type 1, 1 item	**Luninets Forestry Enterprise**, type 1, 1 item															
	Lyakhovichy Forestry Enterprise, type 1, 1 item	**Lyakhovichy Forestry Enterprise**, type 1, 1 item															
	Malorita Forestry Enterprise, type 1, 1 item	**Malorita Forestry Enterprise**, type 1, 1 item															
	Pinsk Forestry Enterprise, type 1, 1 item	**Pinsk Forestry Enterprise**, type 1, 1 item												**Pinsk Forestry Enterprise**, 1 item			
	Pruzhany Forestry Enterprise, type 1, 1 item	**Pruzhany Forestry Enterprise**, type 1, 1 item															
	Stolin Forestry Enterprise, type 1, 1 item	**Stolin Forestry Enterprise**, type 1, 1 item															
	Telekhany Forestry Enterprise, type 1, 1 item	**Telekhany Forestry Enterprise**, type 1, 1 item															
TOTAL for Brest SPFA	**Type 1 – 15 items**	**Type 1 – 15 items**	**1 item**		**127 items**	**3000 items**	**19600 items**	**1 item**	**1 item**					**4 items**			

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	**Forwarders** (type 1 - Vimek, type 2 - Amkodor)	**Loaders**	**Lifts**	**Plastic Boxes**	**Metal holders**	**Cassettes**	**Set of replacement equipment**	**Device for breaking bales of compressed peat**	**Mobile Wood Chippers**	**Equipment for mechanized cleaning of cutting areas**	**Forwarders Amkodor**	**Harvesters Amkodor,**	**Terrain vehicles designed to extinguish fires with water**	**Utility terrain vehicles wth a cargo platform**	**Terrain vehicles for forest fire protection**	**Video surveillance systems**
Vitebsk State Production Forestry Association											**Bogushevsk Forestry Enterprise**, 1 item					**Bogushevsk Forestry Enterprise**, 1 item	
											Vitebsk Forestry Enterprise, 1 item				**Vitebsk Forestry Enterprise**, 1 item	**Vitebsk Forestry Enterprise**, 1 item	
											Verkhnedvinsk Forestry Enterprise, 1 item					**Verkhnedvinsk Forestry Enterprise**, 1 item	
	Glubokoe Forestry Enterprise, type 2, 1 item	**Glubokoe Forestry Enterprise**, type 2, 1 item	**Glubokoe Forestry Enterprise**, 1 item	**Glubokoe Forestry Enterprise**, item	**Glubokoe Forestry Enterprise**, 17 280 items						**Glubokoe Forestry Enterprise**, 1 item						
											Disna Forestry Enterprise, 1 item				**Disna Forestry Enterprise**, 5 items		
											Dretun Forestry Enterprise, 1 item					**Dretun Forestry Enterprise**, 1 item	
																Lepel Forestry Enterprise, 1 item	
											Liozno Forestry Enterprise, 1 item	**Liozno Forestry Enterprise**, 1 item	**Liozno Forestry Enterprise**, 1 item		**Liozno Forestry Enterprise**, 5 items	**Liozno Forestry Enterprise**, 1 item	
																Orsha Forestry Enterprise, 1 item	
											Polotsk Forestry Enterprise, 1 item					**Polotsk Forestry Enterprise**, 1 item	
															Postavy Forestry Enterprise, 1 item	**Postavy Forestry Enterprise**, 1 item	
	Rossony Forestry Enterprise, type 2, 1 item	**Rossony Forestry Enterprise**, type 2, 1 1 item									**Rossony Forestry Enterprise**, 1 item					**Rossony Forestry Enterprise**, 1 item	
															Surazh Forestry Enterprise, 1 item	**Surazh Forestry Enterprise**, 1 item	
											Tolochin Forestry Enterprise, 1 item					**Tolochin Forestry Enterprise**, 1 item	
											Ushacha Forestry Enterprise, 1 item					**Ushacha Forestry Enterprise**, 1 item	**Ushacha Forestry Enterprise**, 1 item
											Shumilino Forestry Enterprise, 1 item				**Shumilino Forestry Enterprise**, 3 items		
TOTAL for Vitebsk SPFA	**Type 2 – 2 items**	**Type 2 - 2 items**	**1 item**	**1 item**	**17 280 items**						**12 items**	**1 item**	**1 item**		**16 items**	**13 items**	**1 item**

Gomel State Production Forestry Association

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	Forwarders (type 1 - Vimek, type 2 - Amkodor)	Loaders	Lifts	Plastic Boxes	Metal holders	Cassettes	Set of replacement equipment	Device for breaking bales of compressed peat	Mobile Wood Chippers	Equipment for mechanized cleaning of cutting areas	Forwarders Amkodor	Harvesters Amkodor,	Terrain vehicles designed to extinguish fires with water	Utility terrain vehicles wth a cargo platform	Terrain vehicles for forest fire protection	Video surveillance systems
	Vasilevichy Forestry Enterprise, type 1, 1 item	**Vasilevichy Forestry Enterprise**, type 1, 1 item															
	Gomel Experimental Forestry Enterprise, type 1, 1 item	**Gomel Experimental Forestry Enterprise**, type 1, 1 item												**Gomel Experimental Forestry Enterprise**, 1 item			
	Elsk Forestry Enterprise, type 1, 1 item	**Elsk Forestry Enterprise**, type 1, 1 item															
														Zhlobin Forestry Enterprise, 1 item			
	Kalinkovichy Forestry Enterprise, type 1, 1 item	**Kalinkovichy Forestry Enterprise**, type 1, 1 item												**Kalinkovichy Forestry Enterprise**, 1 item	**Kalinkovichy Forestry Enterprise**, 1 item		
	Komarin Forestry Enterprise, type 1, 1 item	**Komarin Forestry Enterprise**, type 1, 1 item															
	Lelchitsy Forestry Enterprise, type 1, 1 item	**Lelchitsy Forestry Enterprise**, type 1, 1 item															
	Loev Forestry Enterprise, type 1, 2 items	**Loev Forestry Enterprise**, type 1, 2 items													**Loev Forestry Enterprise**, 2 items		
	Miloshevichy Forestry Enterprise, type 1, 1 item	**Miloshevichy Forestry Enterprise**, type 1, 1 item												**Miloshevichy Forestry Enterprise**, 1 item	**Miloshevichy Forestry Enterprise**, 4 items		
	Oktyabrsky Forestry Enterprise, type 1, 1 item	**Oktyabrsky Forestry Enterprise**, type 1, 1 item													**Oktyabr Forestry Enterprise**, type 1, 1 item		
	Petrikov Forestry Enterprise, type 1, 1 item	**Petrikov Forestry Enterprise**, type 1, 1 item												**Petrikov Forestry Enterprise**, 1 item	**Petrikov Forestry Enterprise**, 1 item		
	Rechitsa Experimental Forestry Enterprise, type 1, 1 item	**Rechitsa Experimental Forestry Enterprise**, type 1, 1 item															
	Rogachev Forestry Enterprise, type 1, 1 item	**Rogachev Forestry Enterprise**, type 1, 1 item															
	Svetlogorsk Forestry Enterprise, type 1, 1 item	**Svetlogorsk Forestry Enterprise**, type 1, 1 item															
	Khoiniki Forestry Enterprise, type 1, 1 item	**Khoiniki Forestry Enterprise**, type 1, 1 item															
	Chechersk Special Forestry Enterprise, type 1, 1 item	**Chechersk Special Forestry Enterprise**, type 1, 1 item															
TOTAL Gomel SPFA	**Type 1 - 17 items**	**Type 1 - 17 items**												**5 items**	**9 items**		

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	Forwarders (type 1 - Vimek, type 2 - Amkodor)	Loaders	Lifts	Plastic Boxes	Metal holders	Cassettes	Set of replacement equipment	Device for breaking bales of compressed peat	Mobile Wood Chippers	Equipment for mechanized cleaning of cutting areas	Forwarders Amkodor	Harvesters Amkodor,	Terrain vehicles designed to extinguish fires with water	Utility terrain vehicles wth a cargo platform	Terrain vehicles for forest fire protection	Video surveillance systems
Grodno State Production Forestry Association	**Grodno Forestry Enterprise**, type 1, 1 item	**Grodno Forestry Enterprise**, type 1, 1 item													**Grodno Forestry Enterprise**, 2 items	**Grodno Forestry Enterprise**, 1 item	
	Dyatlovo Forestry Enterprise, type 1, 1 item	**Dyatlovo Forestry Enterprise**, type 1, 1 item															
	Ivye Forestry Enterprise, type 1, 1 item	**Ivye Forestry Enterprise**, type 1, 1 item															
	Novogrudok Forestry Enterprise, type 1, 1 item	**Novogrudok Forestry Enterprise**, type 1, 1 item														**Novogrudok Forestry Enterprise**, 1 item	**Novogrudok Forestry Enterprise**, 2 items
	Skidel Forestry Enterprise, type 1, 1 item	**Skidel Forestry Enterprise**, type 1, 1 item													**Skidel Forestry Enterprise**, 2 items		
	Slonim Forestry Enterprise, type 1, 1 item	**Slonim Forestry Enterprise**, type 1, 1 item															
															Smorgon Experimental Forestry Enterprise, 2 items	**Smorgon Experimental Forestry Enterprise**, 1 item	
	Shchuchin Forestry Enterprise, type 1, 1 item	**Shchuchin Forestry Enterprise**, type 1, 1 item															
TOTAL for Grodno SPFA	**Type 1 – 8 items**	**Type 1 – 8 items**													**6 items**	**3 items**	**2 items**

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	Forwarders (type 1 - Vimek, type 2 - Amkodor)	Loaders	Lifts	Plastic Boxes	Metal holders	Cassettes	Set of replacement equipment	Device for breaking bales of compressed peat	Mobile Wood Chippers	Equipment for mechanized cleaning of cutting areas	Forwarders Amkodor	Harvesters Amkodor,	Terrain vehicles designed to extinguish fires with water	Utility terrain vehicles wth a cargo platform	Terrain vehicles for forest fire protection	Video surveillance systems
Minsk State Production Forestry Enterprise	**Borisov Experimental Forestry Enterprise**, type 1, 1 item	**Borisov Experimental Forestry Enterprise**, type 1, 1 item														**Borisov Experimental Forestry Enterprise**, 1 item	
	Vileyka Experimental Forestry Enterprise, type 1, 1 item	**Vileyka Experimental Forestry Enterprise**, type 1, 1 item															
	Volozhin Forestry Enterprise, type 1, 1 item	**Volozhin Forestry Enterprise**, type 1, 1 item															
	Kletsk Forestry Enterprise, type 1, 1 item	**Kletsk Forestry Enterprise**, type 1, 1 item														**Kletsk Forestry Enterprise**, 1 item	
	Kopyl Experimental Forestry Enterprise, type 1, 1 item	**Kopyl Experimental Forestry Enterprise**, type 1, 1 item															
	Krupki Forestry Enterprise, type 1, 1 item	**Krupki Forestry Enterprise**, type 1, 1 item														**Krupki Forestry Enterprise**, 1 item	
	Logoysk Forestry Enterprise, type 1, 2 items	**Logoysk Forestry Enterprise**, type 1, 2 items														**Logoysk Forestry Enterprise**, 1 item	
	Lyuban Forestry Enterprise, type 1, 1 item	**Lyuban Forestry Enterprise**, type 1, 1 item														**Lyuban Forestry Enterprise**, 1 item	
	Minsk Forestry Enterprise, type 1, 1 item	**Minsk Forestry Enterprise**, type 1, 1 item														**Minsk Forestry Enterprise**, 1 item	
	Molodechno Forestry Enterprise, type 1, 1 item	**Molodechno Forestry Enterprise**, type 1, 1 item														**Molodechno Forestry Enterprise**, 1 item	
	Pukhovichy Forestry Enterprise, type 1, 1 item	**Pukhovichy Forestry Enterprise**, type 1, 1 item										**Pukhovichy Forestry Enterprise**, 1 item	**Pukhovichy Forestry Enterprise**, 1 item				
	Smolevichy Forestry Enterprise, type 1, 1 item	**Smolevichy Forestry Enterprise**, type 1, 1 item								**Smolevichy Forestry Enterprise**, 1 item							

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	**Forwarders** (type 1 - Vimek, type 2 - Amkodor)	**Loaders**	**Lifts**	**Plastic Boxes**	**Metal holders**	**Cassettes**	**Set of replacement equipment**	**Device for breaking bales of compressed peat**	**Mobile Wood Chippers**	**Equipment for mechanized cleaning of cutting areas**	**Forwarders Amkodor**	**Harvesters Amkodor,**	**Terrain vehicles designed to extinguish fires with water**	**Utility terrain vehicles wth a cargo platform**	**Terrain vehicles for forest fire protection**	**Video surveillance systems**
	Starobin Forestry Enterprise, type 1, 1 item	**Starobin Forestry Enterprise**, type 1, 1 item														**Starobin Forestry Enterprise**, 1 item	
	Starye Dorogi Experimental Forestry Enterprise, type 1, 2 items	**Starye Dorogi Experimental Forestry Enterprise,** type 1, 2 items														**Starye Dorogi Experimental Forestry Enterprise,** 1 item	
	Stolbtsy Forestry Enterprise, type 1, 1 item	**Stolbtsy Forestry Enterprise**, type 1, 1 item										**Stolbtsy Forestry Enterprise**, 1 item	**Stolbtsy Forestry Enterprise**, 1 item			**Stolbtsy Forestry Enterprise**, 1 item	
	Uzda Forestry Enterprise, type 1, 1 item	**Uzda Forestry Enterprise**, type 1, 1 item								**Uzda Forestry Enterprise**, 1 item						**Uzda Forestry Enterprise**, 1 item	
	Cherven Forestry Enterprise, type 1, 1 item	**Cherven Forestry Enterprise**, type 1, 1 item										**Cherven Forestry Enterprise**, 1 item	**Cherven Forestry Enterprise**, 1 item				
						Republican Forestry Seed and Selection Center, metal frames, 7 000 items											
TOTAL for Minsk SPFA	**Type 1 - 21 items**	**Type 1 - 21 items**				**7 000 items**				**2 items**		**4 items**	**4 items**			**12 items**	

	Harvesters (type 1 - Vimek, type 2 - Amkodor)	**Forwarders** (type 1 - Vimek, type 2 - Amkodor)	**Loaders**	**Lifts**	**Plastic Boxes**	**Metal holders**	**Cassettes**	**Set of replacement equipment**	**Device for breaking bales of compressed peat**	**Mobile Wood Chippers**	**Equipment for mechanized cleaning of cutting areas**	**Forwarders Amkodor**	**Harvesters Amkodor,**	**Terrain vehicles designed to extinguish fires with water**	**Utility terrain vehicles wth a cargo platform**	**Terrain vehicles for forest fire protection**	**Video surveillance systems**
Mogilev State Production Forestry Association	**Belynichy Forestry Enterprise**, type 1, 1 item	**Belynichy Forestry Enterprise**, type 1, 1 item														**Belynichy Forestry Enterprise**, 1 item	
	Bobruisk Forestry Enterprise, type 1, 1 item	**Bobruisk Forestry Enterprise**, type 1, 1 item														**Bobruisk Forestry Enterprise**, 1 item	
	Bykhov Forestry Enterprise, type 1, 1 item	**Bykhov Forestry Enterprise**, type 1, 1 item															
	Gorki Forestry Enterprise, type 1, 1 item	**Gorki Forestry Enterprise**, type 1, 1 item															
	Glusk Forestry Enterprise, type 1, 1 item	**Glusk Forestry Enterprise**, type 1, 1 item															
	Klimovichy Forestry Enterprise, type 1, 1 item	**Klimovichy Forestry Enterprise**, type 1, 1 item															
	Klichev Forestry Enterprise, type 1, 1 item	**Klichev Forestry Enterprise**, type 1, 1 item															
	Kostyukovichy Forestry Enterprise, type 1, 1 item	**Kostyukovichy Forestry Enterprise**, type 1, 1 item															
	Krasnopolye Forestry Enterprise, type 1, 1 item	**Krasnopolye Forestry Enterprise**, type 1, 1 item										**Krasnopolye Forestry Enterprise**, 1 item	**Krasnopolye Forestry Enterprise**, 1 item				
	Mogilev Forestry Enterprise, type 1, 1 item	**Mogilev Forestry Enterprise**, type 1, 1 item														**Mogilev Forestry Enterprise**, 1 item	
	Osipovichy Forestry Enterprise, type 1, 1 item	**Osipovichy Forestry Enterprise**, type 1, 1 item															
	Chausy Forestry Enterprise, type 1, 1 item	**Chausy Forestry Enterprise**, type 1, 1 item															
	Cherikov Forestry Enterprise, type 1, 1 item	**Cherikov Forestry Enterprise**, type 1, 1 item															
TOTAL for Mogilev SPFA	**Type 1 – 13 items**	**Type 1 – 13 items**										**1 item**	**1 item**			**3 items**	
GRAND TOTAL:	**Type 1 – 74 items; Type 2 – 2 items**	**Type 1 – 74 items; Type 2 – 2 items**	**2 items**	**1 item**	**17 430 items**	**10 700**	**19 600 items**	**1 items**	**1 items**	**2 items**	**12 items**	**6 items**	**6 items**	**8 items**	**31 items**	**31 items**	**3 items**

	Harvesters Komatsu	Harvesters Amkodor	Forwarders Amkodor	Harvesters Vimek	Forwarders Vimek	Multi-functional loaders	Diesel forklift loader	Soil filling and seed line	Equipment for drying the softwood seed raw material (cones)	Racks	seed de-winging plant	Exchange module kit	Plastic box intended for packing	Metal holders to place the containers (metal frames)	Tank truck 1/6 GAZ	Tank truck 1/6 GAZ	Plastic cassetes
Vitebsk State Production Forestry Enterprise												**Glubokoe Experimental Forestry Enterprise**, 1 item					**Glubokoe Experimental Forestry Enterprise**, 30 240 items
TOTAL for Vitebsk SPFA												**1 item**					**30 240 items**
Gomel State Production Forestry Enterprise		**Vasilevichy Forestry Enterprise**, 1 item	**Vasilevichy Forestry Enterprise**, 1 item														
		Vetka Special Forestry Enterprise, 1 item	**Vetka Special Forestry Enterprise**, 1 item														
		Gomel Experimental Forestry Enterprise, 1 item															
		Elsk Forestry Enterprise, 1 item															
		Zhitkovichy Forestry Enterprise, 1 item	**Zhitkovichy Forestry Enterprise**, 1 item														
		Zhlobin Forestry Enterprise, 1 item															
		Kalinkovichy Forestry Enterprise, 1 item															
		Komarin Forestry Enterprise, 1 item	**Komarin Forestry Enterprise**, 1 item														
		Narovlya Special Forestry Enterprise, 1 item	**Narovlya Special Forestry Enterprise**, 1 item														
		Petrikov Forestry Enterprise, 1 item															
		Rechitsa Experimental Forestry Enterprise, 1 item															
		Svetlogorsk Forestry Enterprise, 1 item															
TOTAL for Gomel SPFA		**12 items**	**5 items**														

	Harvesters Komatsu	Harvesters Amkodor	Forwarders Amkodor	Harvesters Vimek	Forwarders Vimek	Multi-functional loaders	Diesel forklift loader	Soil filling and seed line	Equipment for drying the softwood seed raw material (cones)	Racks	seed de-winging plant	Exchange module kit	Plastic box intended for packing	Metal holders to place the containers (metal frames)	Tank truck 1/6 GAZ	Tank truck 1/6 GAZ	Plastic cassetes
Grodno State Production Forestry Association	**Grodno Forestry Enterprise**, 1 item																
	Dyatlovo Forestry Enterprise, 1 item																
	Ivye Forestry Enterprise, 1 item																
	Lida Forestry Enterprise, 1 item																
	Novogrudok Forestry Enterprise, 1 item																
	Ostrovets Forestry Enterprise, 1 item																
	Slonim Forestry Enterprise, 1 item																
	Smorgon Experimental Forestry Enterprise, 1 item																
	Shchuchin Forestry Enterprise, 1 item																
TOTAL for Grodno SPFA	**9 items**																

	Harvesters Komatsu	Harvesters Amkodor	Forwarders Amkodor	Harvesters Vimek	Forwarders Vimek	Multi-functional loaders	Diesel forklift loader	Soil filling and seed line	Equipment for drying the softwood seed raw material (cones)	Racks	seed de-winging plant	Exchange module kit	Plastic box intended for packing	Metal holders to place the containers (metal frames)	Tank truck 1/6 GAZ	Tank truck 1/6 GAZ	Plastic cassetes
Minsk State Production Forestry Association						**Republican Forestry Seed and Selection Center**, 1 item	**Republican Forestry Seed and Selection Center**, 1 item		**Republican Forestry Seed and Selection Center**, 1 item	**Republican Forestry Seed and Selection Center**, 1 item	**Republican Forestry Seed and Selection Center**, 1 item		**Republican Forestry Seed and Selection Center**, 40 000	**Republican Forestry Seed and Selection Center**, 7 000 items			**Republican Forestry Seed and Selection Center**, 205 000 items
TOTAL for Minsk SPFA						**1 item**	**1 item**		**1 item**	**1 item**			**40 000 items**	**7 000 items**			**205 000 items**
Mogilev State Production Forestry Association				**Bykhov Forestry Enterprise 1 item**	**Bykhov Forestry Enterprise 1 item**												
				Glussk Forestry Enterprise 1 item													
				Mogilev Forestry Enterprise, 1 item	**Mogilev Forestry Enterprise**, 1 item	**Mogilev Forestry Enterprise**, 1 item		**Mogilev Forestry Enterprise**, 1 item						**Mogilev Forestry Enterprise** ,2 651 items	**Mogilev Forestry Enterprise**, 1 item	**Mogilev Forestry Enterprise**, 1 item	**Mogilev Forestry Enterprise**, 24 500 items
TOTAL for Mogilev SPFA				**3 items**	**2 items**	**1 item**		**1 item**						**8171 items**			**24 500 items**
GRAND TOTAL:	**9 items**	**12 items**	**5 items**	**3 items**	**2 items**	**2 items**	**1 item**	**1 item**	**1 item**	**1 item**	**1 item**	**1 item**	**40 000 items**	**16 571 items**	**1 item**	**1 item**	**259 740 items**

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
Republican Breeding and Seed Production Center	**RLSSC, 2 item**	**RLSSC, 1 item**																		
RUE "Bellesozashita"		**Bellesozashita, 3 items**	**Bellesozashita, 6 items**	**Bellesozashita, 1 item**	**Bellesozashita, 1 item**	**Bellesozashita, 1 items**			**Bellesozashita, 12 items**											
RUE "Belgos les"					**Belgosles, 4 items**	**Belgosles, 8 items**	**Belgosles, 1 item**	**Belgosles, 1 item**												
Republican Center for Advanced Training of Executives and Forestry Specialists																			**RUC-les 2 items**	**RUC-les 2 items**
Brest State Production Forestry Association	**Baranovichy Forestry Enterprise**,1 item	**Baranovichy Forestry Enterprise**, 1 item										**Baranovichy Forestry Enterprise,** 1 item	**Baranovichy Forestry Enterprise,** 1 item	**Baranovichy Forestry Enterprise,** 1 item						
	Brest Forestry Enterprise, 1 items	**Brest Forestry Enterprise**, 1 items																		
	Gantsevichy Foresrty Enterprise, 1 item	**Gantsevichy Foresrty Enterprise**, 1 item																		
	Drogichyn Forestry Enterprise, 1 item	**Drogichyn Forestry Enterprise**, 1 item																		
	Ivatsevichy Forestry Enterprise, 2 items	**Ivatsevichy Forestry Enterprise**, 1 item															**Ivatsevichy Forestry Enterprise,** 1 item	**Ivatsevichy Forestry Enterprise,** 1 item		
	Kobrin Experimental Forestry Enterprise, 1 item	**Kobrin Experimental Forestry Enterprise**, 1 item																		
	Luninets Forestry Enterprise, 1 item	**Luninets Forestry Enterprise**, 1 item																		
	Pinsk Forestry Enterprise, 1 item	**Pinsk Forestry Enterprise**, 1 item																		

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
										Polesski Forestry Enterprise, 118 items	Polesski Forestry Enterprise, 6 items				Polesski Forestry Enterprise, 1 item	Polesski Forestry Enterprise, 1 item		Polesski Forestry Enterprise, 1 item			
	Telekhany Forestry Enterprise, 1 item	Telekhany Forestry Enterprise, 1 item																		
TOTAL for Brest SPFA	**10 items**	**9 items**								**118 items**	**6 item**	**1 item**	**1 item**	**1 item**	**1 item**	**1 item**	**1 item**	**2 items**		
Vitebsk State Production Forestry Association	Begoml Forestry Enterprise, 1 item	Begoml Forestry Enterprise, 1 item																		
	Beshenkovichy Forestry Enterprise, 1 item	Beshenkovichy Forestry Enterprise, 1 item																		
	Bogushevsk Forestry Enterprise, 1 item	Bogushevsk Forestry Enterprise, 1 item																		
	Vitebsk Forestry Enterprise, 1 item	Vitebsk Forestry Enterprise, 1 item																		
	Verkhnedvinsk Forestry Enterprise, 1 item	Verkhnedvinsk Forestry Enterprise, 1 item																		
	Glubokoe Experimental Forestry Enterprise, 2 items	Glubokoe Experimental Forestry Enterprise, 1 item																		
	Gorodok Forestry Enterprise, 1 item	Gorodok Forestry Enterprise, 1 item																		
	Disna Forestry Enterprise, 1 item	Disna Forestry Enterprise, 1 item																		
	Lepel Forestry Enterprise, 1 item	Lepel Forestry Enterprise, 1 item																		
	Liozno Forestry Enterprise, 1 item	Liozno Forestry Enterprise, 1 item																		
	Orsha Forestry Enterprise, 1 item	Orsha Forestry Enterprise, 1 item																		
	Polotsk Forestry Enterprise, 1 item	Polotsk Forestry Enterprise, 1 item																		
	Postavy Forestry Enterprise, 1 item	Postavy Forestry Enterprise, 1 item																		

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
	Rossony Forestry Enterprise,, 1 item	Rossony Forestry Enterprise, 1 item																		
	Tolochin Forestry Enterprise, 1 item	Tolochin Forestry Enterprise, 1 item																		
	Ushacha Forestry Enterprise, 1 item	Ushacha Forestry Enterprise, 1 item																		
	Shumilino Forestry Enterprise, 1 item	Shumilino Forestry Enterprise, 1 item																		
TOTAL for Vitebsk SPFA	**18 items**	**17 items**																		
Gomel State Production Forestry Association	Buda-Koshelevo Experimental Forestry Enterprise , 1 item	Buda-Koshelevo Experimental Forestry Enterprise, 1 item																		
	Gomel Experimental Forestry Enterprise , 1 item	Gomel Experimental Forestry Enterprise, 1 item																		
	Zhlobin Forestry Enterprise, 1 item	Zhlobin Forestry Enterprise, 1 item																		
	Kalinkovichy Forestry Enterprise, 1 item	Kalinkovichy Forestry Enterprise, 1 item																		
	Miloshevichy Forestry Enterprise, 1 item	Miloshevichy Forestry Enterprise, 1 item																		
	Mozyr Forestry Enteprise, 1 item	Mozyr Forestry Enteprise, 1 item																		
	Petrikov Forestry Enterprise, 1 item	Petrikov Forestry Enterprise, 1 item																		
	Rechitsa Experimental Forestry Enterprise, 1 item	Rechitsa Experimental Forestry Enterprise, 1 item																		
	Svetlogorsk Forestry Enterprise, 1 item	Svetlogorsk Forestry Enterprise, 1 item																		
TOTAL for Gomel SPFA	**9 items**	**9 items**																		

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
Grodno State Production Forestry Association	Volkovysk Forestry Enterprise, 1 item	Volkovysk Forestry Enterprise, 1 item																		
	Grodno Forestry Enterprise, 1 item	Grodno Forestry Enterprise, 1 item																		
	Dyatlovo Forestry Enterprise, 1 item	Dyatlovo Forestry Enterprise, 1 item																		
	Ivye Forestry Enterprise, 1 item	Ivye Forestry Enterprise, 1 item																		
	Lida Forestry Enteprise, 1 item	Lida Forestry Enteprise, 1 item																		
	Novogrudok Forestry Enterprise, type 1, 1 item	Novogrudok Forestry Enterprise, 1 item																		
	Ostrovec Forestry Enterprise, 1 item	Ostrovec Forestry Enterprise, 1 item																		
	Slonim Forestry Enterprise, type 1, 1 item	Slonim Forestry Enterprise, 1 item																		
	Smorgon Experimental Forestry Enterprise, 1 items	Smorgon Experimental Forestry Enterprise, 1 items																		
	Shchuchin Forestry Enterprise, 1 item	Shchuchin Forestry Enterprise, 1 item																		
TOTAL for Grodno SPFA	**10 items**	**10 items**																		

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
Minsk State Production Forestry Enterprise	Berezino Forestry Enterprise, 1 item	Berezino Forestry Enterprise, 1 items																		
	Borisov Experimental Forestry Enterprise, 1 item	Borisov Experimental Forestry Enterprise, 1 item																		
	Vileyka Experimental Forestry Enterprise, 1 item	Vileyka Experimental Forestry Enterprise, 1 item																		
	Volozhin Forestry Enterprise, 1 item	Volozhin Forestry Enterprise, 1 item																		
	Kletsk Forestry Enterprise, 1 item	Kletsk Forestry Enterprise, 1 item																		
	Kopyl Experimental Forestry Enterprise, 1 item	Kopyl Experimental Forestry Enterprise, 1 item																		
	Krupki Forestry Enterprise, 1 item	Krupki Forestry Enterprise, 1 item																		
	Logoysk Forestry Enterprise, 1 item	Logoysk Forestry Enterprise, 1 items																		
	Lyuban Forestry Enterprise, 1 item	Lyuban Forestry Enterprise, 1 item																		
	Minsk Forestry Enterprise, 1 item	Minsk Forestry Enterprise, 1 item																		
	Molodechno Forestry Enterprise, 1 item	Molodechno Forestry Enterprise, 1 item																		
	Pukhovichy Forestry Enterprise, 1 item	Pukhovichy Forestry Enterprise, 1 item																		
	Slutsk Forestry Enterprise, 1 item	Slutsk Forestry Enterprise, 1 item																		
	Smolevichy Forestry Enterprise, 1 item	Smolevichy Forestry Enterprise,1 item																		
	Starobin Forestry Enterprise, 1 item	Starobin Forestry Enterprise, , 1 item																		

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
	Starye Dorogi Experimental Forestry Enterprise, 2 items	Starye Dorogi Experimental Forestry Enterprise, 2 items																		
	Stolbtsy Forestry Enterprise, , 1 item	Stolbtsy Forestry Enterprise, 1 item																		
	Uzda Forestry Enterprise, 1 item	Uzda Forestry Enterprise, 1 item																		
	Cherven Forestry Enterprise, 1 item	Cherven Forestry Enterprise, 1 item																		
TOTAL for Minsk SPFA	**19 items**	**Type 19 items**																		

	Hand sprayer	The protective kit	Equipment for testing and repairing fire hoses	Vehicle for transporting equipment and workers	Tablet	Rangefinder	Unmanned aerial vehicle	Vehicle for transporting	Office equipment	Firehose	Mud motor pumps	Mechanical shovel	Root cutter	Digging machine	Plow	Lowland harrow	Felling clearing device	Tree care device	Simulator Vimek	Simulator Amkodor
Mogilev State Production Forestry Association	Belynichy Forestry Enterprise, 1 item	Belynichy Forestry Enterprise, 1 item																		
	Bobruisk Forestry Enterprise, 1 item	Bobruisk Forestry Enterprise, 1 item																		
	Bykhov Forestry Enterprise, , 1 item	Bykhov Forestry Enterprise, 1 item																		
	Goretsk Forestry Enterprise, 1 item	Goretsk Forestry Enterprise, 1 item																		
	Glusk Forestry Enterprise, 1 item	Glusk Forestry Enterprise, 1 item																		
	Klimovichy Forestry Enterprise, 1 item	Klimovichy Forestry Enterprise,1 item																		
	Klichev Forestry Enterprise, 1 item	Klichev Forestry Enterprise, 1 item																		
	Kostyukovichy Forestry Enterprise, 1 item	Kostyukovichy Forestry Enterprise, 1 item																		
	Krasnopolye Forestry Enterprise, 1 item	Krasnopolye Forestry Enterprise,1 item																		
	Mogilev Forestry Enterprise, 2 item	Mogilev Forestry Enterprise, 1 item																		
	Osipovichy Experimental Forestry Enterprise, 1 item	Osipovichy Experimental Forestry Enterprise, 1 item																		
	Chausy Forestry Enterprise, 1 item	Chausy Forestry Enterprise, 1 item																		
	Cherikov Forestry Enterprise, 1 item	Cherikov Forestry Enterprise, 1 item																		
TOTAL for Mogilev SPFA	**14 items**	**13 items**																		
GRAND TOTAL:	**82**	**81**	**6 items**	**1 item**	**5 items**	**8 items**	**1 item**	**1 item**	**12 items**	**118 items**	**6 items**	**1 item**	**1 item**	**1 item**	**1 item**	**1 item**	**1 item**	**2 items**	**2 items**	**2 items**

ANNEX 3

Results Framework and Monitoring

Belarus
Project Name: Forestry Development Project (P147760)
Results Framework for the period from 01.07.2015 till 30.07.2021

Project Development Objectives

PDO Statement

The Project Development Objective is to enhance silvicultural management and re/afforestation, increase the use of felling residues and improve the public good contribution from forests in targeted forest areas.

These results are at	Project Level

Project Development Objective Indicators

Indicator Name	Baseline	Cumulative Target Values						Indicator description	Comments
		YR1 01.07.2015/ 30.06. 2016 Plan/actual	YR2 01.07.2016/ 30.06.2017 Plan/actual	YR3 01.07.2017/ 30.06.2018 Plan/actual	YR4 01.07.2018/ 01.07.2019 Plan/actual	YR5 01.07.2019 01.07.2020 Plan/actual	End Target YR6 01.07.2020 01.01.2021 Plan/actual		
Area of young and middle-aged production-forest thinned according to approved management plans (Hectare(Ha))	132 500	140 000/ 146 200	150 000/ 151 574.2	160 000/ 136 500	165 000/ 110813	165 000/ 168 000	165 000/ 167 000	Includes area of young and middle-aged production-forest thinned according to approved management plans (Hectare (Ha))	The indicator was updated July 2021. Each Vimek harvester annually harvests about 11 thousand m3 per year of wood from thinnnings. In total, 183 units of thinning equipment were delivered. Completed 6 contracts for the supply of equipment Vimek, Komatsu, Amkodor №BFDP/ICB/15/01 (126 units) № BFDP/DC/18/01-3 (22 units) №BFDP/DC/18/02-3 (5 units) №BFDP/ICB/15/01-1 (4 units) №BFDP/RFB/18/02-1 (9 units) №BFDP/RFB/18/02-2 (17 units)

Economic performance of participating SFEs enhanced (Amount(USD))	0	605 000/ 631 000	4 939 000/ 7 680 000	10 496 000/ 11 405 500	12 723 000/ 17 412 000	12 723 000/ 22 604 000	15 826 000/ 46 600 000	The net profit of the forestry enterprises – participants of the Project is indicated.	The indicator was updated July 2021. Due to the favorable price for wood in the external and internal markets, the net profit of the leshozes increased in 2020-2021. For example, the price of lumber in 2020 has doubled. The leshozes are planning to use the net profit for investment expenses: • to repay the loans of the World Bank under the Forestry Development Project; • to repay loans for the construction of new pellet production facilities; • for technical re-equipment of logging activities; • to pay off lease payments for the purchase of equipment. The net profit of the leshozes increased by US $ 46.6 million by 2021 compared to the base year 2015.
Capacity to produce high quality seedlings increased (number of container grown seedlings) (Number)	0	0/0	2 000 000/0	1 000 000/ 1 000 000	4 000 000/ 5 520 000	9 750 000/ 14 341 200	23 700 000 / 25 100 000	Planned capacity for in 4 forest nurseries is indicated.	In spring 2021 seedings lines in 4 nurseries were loaded. Actual capacity for 2-3 rotations of the forest nurseries in Ivatsevichy State Forestry Enterprise, Glubokoe State Experimental Forestry Enterprise and Republican Seed and Selection Center, and Mogilev State Experimental Forestry Enterprise is indicated. 4 contracts for the construction of forest nurseries were completed BFDP/NCB/16/05-1, BFDP/NCB/16/05-2, BFDP/NCB/16/05-5, BFDP/RFB/18/01-1 This indicator even high that was initially planned (23.7 mln. seedlings), in spite of establishment on 4 forest nurseries instead of 6 as was initially planned. This is mainly because the cassettes of type FD 64 and

									FD100 having more planting places and capacities. Usage of planting material will closed root system will ensure creation of economically valuable forest stand in Belarus and export of the planting material in mid-term. It is planned that around 20% of forest cultures in Belarus will be created using high quality planting material in the coming years.
Average utilizable volume of commercial timber harvested during intermediate felling in targeted SFEs increased (Cubic Meter per hectare (m3/ha))	28, 50	30/30,4	31,5/33,5	33/32.6	35/34.5	35/ 34.5	35/35.0	The ratio of the area where intermediate felling was carried out to the volume of harvested wood is indicated.	The indicator was updated in July 2021. The optimum indicator for timber harvesting from thinnings is 35 m3/ha. This value is optimum for the productiveness of stands. 3 contracts for supply of Vimek machinery were completed: No. BFDP/ICB/15/01 (126 units) No. BFDP/DC/18/01-3 (22 units) No. BFDP/ DC/18/02-3 (5 units) Wood harvested at thinning is mainly sold on the domestic market among woodworking enterprises. The profit of the leshozes is insignificant from this type of activity.

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Global Environmental Objective Indicators

Indicator Name	Baseline	Cumulative Target Values						Indicator description	Comments
		YR1 01.07.2015/ 30.06. 2016 Plan/actual	YR2 01.07.2016/ 30.06.2017 Plan/actual	YR3 01.07.2017/ 30.06.2018 Plan/actual	YR4 01.07.2018/ 01.07.2019 Plan/actual	YR5 01.07.2019/ 01.07.2020 Plan/actual	End Target YR6 01.07.2020/ 01.01.2021 Plan/actual		
Amount of carbon sequestered (Metric ton)	4 643 384	4 643 384/ 4 712 725	4 727 809/ 4 398 373	4 812 234/ 3 540 464	4 981 083/ 3 645 887	4 981 083/ 5 285 315	5 245 627 / 6 178 052	The indicators are calculated using the	The amount of carbon sequestered was recalculacted based on the actual performance of seeding lines in the four new nurseries. This indicator even high that was initially

								EX-ACT tool.	planned, in spite of establishment on 4 forest nurseries instead of 6 as was initially planned. This is mainly because the cassettes of type FD 64 and FD100 having more planting places and capacities and growing in leschozes' nurseries. The total design annual capacity of 4 tree nurseries will make it possible to create forest cultures on an area of about 6 thousand hectares annually. No. BFDP/NCB/16/05-1 No. BFDP/NCB/16/05-2 No. BFDP/NCB/16/05-5 No. BFDP/RFB/18/01-1

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Intermediate Results Indicators

Indicator Name	Baseline	Cumulative Target Values							
Indicator Name	Baseline	YR1 01.07.2015/ 30.06. 2016 Plan/actual	YR2 01.07.2016/ 30.06.2017 Plan/actual	YR3 01.07.2017/ 30.06.2018 Plan/actual	YR4 01.07.2018/ 01.07.2019 Plan/actual	YR5 01.07.2019 01.07.2020 Plan/actual	End Target YR6 01.07.2020 01.01.2021 Plan/actual	Indicator description	Comments
Nursery lines for container grown seedlings of native tree species established (Number)	0	0/0	2/0	2/1	4/3	4/3	6/4	The number of seed lines in 4 forest nurseries is indicated.	4 seed lines in Ivatsevichy State Forestry Enterprise, Glubokoe State Experimental Forestry Enterprise, Republican Seed and Selection Center, Mogilev State Forestry Enterprise are indicated. Despite the decrease in the number of tree nurseries to 4, it was possible to achieve the amount of planting material more than originally planned for 6 tree nurseries. This is mainly because the cassettes of type FD 64 and FD100 having more planting places and capacities and growing in leschozes' nurseries. The total design annual capacity of 4 tree nurseries will make it possible to create

									forest cultures on an area of about 6 thousand hectares annually. Contracts are completed: №BFDP/NCB/16/05-1, №BFDP/NCB/16/05-2, №BFDP/NCB/16/05-5, №BFDP/RFB/18/01-1
Improved thinning regime developed (Yes/No)	No	Yes	Yes	Yes	Yes	Yes	Yes	The indicator describes the alterations of the legislations of the Republic of Belarus in the field of thinning procedure.	In 2019, Resolution of the Ministry of Forestry No. 68 dated December 19, 2016 "On approval of forest logging operations in the Republic of Belarus" was adjusted to take into account the existing forestry practices, the grounds for logging were clarified, etc. Practical timber harvesting works with preservation of valuable characteristics of the timber were improved due to usage of modern harvesters and forwarders purchased under the project.

Number of people trained (Number, per year)	2 243	2 250/ 3 476	2 330/ 2 496	2 340/ 2 311	2 380/ 2 775	2 380/ 3448*	3 000/ 3448*	The indicator includes the number of people who have been trained on the basis of the "Republican Educational Centre for Training, Retraining and Raising the Level of Skill of Forestry Personnel"	*reporting on this indicator in the Republic of Belarus is formed on the basis of the results of the calendar year (January 2021). 3448 specialists of forest sector were trained on new approaches, practices and technologies on the basis of the Republican Centre for Improvement of Skills of the Manager and Specialists of Forestry Sector (including those trained to work with new harvesters and forwarders). This number of trained specialists include 157 women. Another 1700 people (include 490 women) were trained through participating the workshops, trainings, other events held in the process of researches, development of new legislative documents, etc.

Number of people trained - female (Number - Sub-Type: Breakdown)	110	115/372	130/125	140/127	145/148	145/157*	150/157*	The indicator includes the number of people (female) who have been trained on the basis of the "Republican Educational Centre for Training, Retraining and Raising the Level of Skill of Forestry Personnel"	*reporting on this indicator in the Republic of Belarus is formed on the basis of the results of the calendar year, (January 2021) 157 women-specialists of forest sector were trained on new approaches, practices and technologies on the basis of the Republican Centre for Improvement of Skills of the Manager and Specialists of Forestry Sector. Another 1700 people (include 490 women) were trained through participating the workshops, trainings, other events held in the process of researches, development of new legislative documents, etc. 72 new jobs were established in all the regions of the country due to new forest nurseries. 70% of the jobs are occupied by the women.
Reforms in forest policy, legislation or other regulations supported (Yes/No) - (Core)	No	Yes	Yes	Yes	Yes	Yes	Yes	The indicator describes the alterations of the legislations of the Republic of Belarus	In the result of the project implementation, forest legislation of Belarus was actualized based on the international experience and to ensure harmonization with the international standards (16 normative documents were developed, of which 11 are officially approved, including standards, programs, strategies, etc.). New innovative practices of forestry management, with due regard to the biodiversity conservation in the process of forestry management planning, usage of all the ecosystem services provided by the forests, were introduced. These changes demonstrate change of the institutional framework of the country in the field of forestry management and will have long-term impact.

Govt institutions provided w/ capacity build to improve mgt of forest resources (Number) - (Core)	0	0	2	5/6	8/8	8/8	11/12	The indicator includes the number of organizations (State Forestry Production Associations, the main organizations subordinate to the Ministry of Forestry) who participated in training seminars dedicated to the new investment technologies and program implementation abroad	During period from 2016 till 2019, were 12 study tours: 6 studies for forestry specialists from MoF and SFEs related to international experience in forestry, 6 studies for PIU related to procurement and financial issues.. Capacity building of the forestry manpower - 63 specialists of forestry sector, environmental sector and other stakeholders learned best practices of forestry management at 6 study tours to European countries.
New areas outside protected areas managed as biodiversity-friendly (ha) (Number) - (Core)	1 226 700	1 226 700/ 1 281 670	1 226 700/ 1 320 100	2 536 020/ 4 443 500	3 845 340/ 4 440 592	3 845 340/ 4 464 164	4 500 000/ 4 642 805	The area of mixed stands under the authority of the Ministry of Forestry is indicated, with the exception of specially protected natural areas (forest reserves and	Taking into account the new requirements of the Forest Code of the Republic of Belarus, forest management throughout the territory is carried out with an emphasis on biodiversity conservation. The indicator show the area of mixed forest plantations (consisting of 2-10 species) on which various types of forestry work are carried out annually. Within the framework of the project, forest areas subject to special protection were identified in 6 leshozes, and forest management projects for these leshozes were approved, taking into account the

								natural monuments).	norms of the Forest Code on biodiversity conservation.
Project-supported organization(s) publish reports on inputs and effect of consultation and information dissemination activities on project/program /policies (Yes/No)	No	No	Yes	Yes	Yes	Yes	Yes		Final reports for 20 Project Activities are available on the UE "Bellesexport" and MOF websites (available for 2+ years if needed)
Direct project beneficiaries (Number)-(Core)	0	35 000	35 000/ 37 165	35 500/ 37 820	35 500/ 37 924	35 500/ 37 924	35 500/ 38 487	The number of forest sector staff is indicated	*reporting on this indicator in the Republic of Belarus is formed on the basis of the results of the calendar year. 267 new jobs were established due to the project, including 72 new jobs related to new forest nurseries (mainly for women) and 195 jobs for operators of harvesters and forwarders.
Female beneficiaries (Percentage-Sub-Type: Supplemental)-(Core)	0	17,3	17,3	17,2	17,4	17,4	17,5/ 17,7	The percentage of forest sector staff – women is indicated	72 new jobs were established in all the regions of the country due to new forest nurseries. 70% of the jobs are occupied by the women. 157 women-specialists of forest sector were trained on new approaches, practices and technologies on the basis of the Republican Centre for Improvement of Skills of the Manager and Specialists of Forestry Sector. Another 1700 people (include 490 women) were trained through participating the workshops, trainings, other events held in

									the process of researches, development of new legislative documents, etc.

Indicator Description

Project Development Objective Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Area of young and middle-aged production-forest thinned according to approved management plans	This indicator is linked to the PDO to enhance silvicultural management of forests.	Bi-annual	Bi-annual progress reports	SFEs/MOF/PIU
Economic performance of participating SFEs enhanced	This indicator measures the excess of revenue over expenditures inclusive of all financing sources	Bi-annual	Bi-annual progress reports / analysis of SFE accounts	SFEs/MOF/PIU
Capacity to produce high quality seedlings increased (number of container grown seedlings)	This indicator measures the number of container grown seedlings for afforestation and reforestation purposes.	Bi-annual	Bi-annual progress reports	SFEs/MOF/PIU
Average utilizable volume of commercial timber harvested during intermediate felling in targeted SFEs increased	This indicator covers the use of felling waste in participating State Forest Enterprises. The unit of measure is actually m3 per hectare	Bi-annual	Bi-annual progress reports	SFEs/MOF/PIU

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Global Environmental Objective Indicators

Indicator Name	Description (indicator definition etc.)
Amount of carbon sequestered	This indicator is based on calculations of the amount of carbon sequestered using the EX-ACT Carbon

	Accounting Tool developed by FAO. The baseline values was calculated during project preparation and will be updated and refined during project implementation (frequency: annually)

Intermediate Results Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Nursery lines for container grown seedlings of native tree species established	This indicator monitors the capacity to produce high quality container grown seedlings	Bi-annual	Bi-annual progress reports	SFEs/MOF/PIU
Improved thinning regime developed	This indicator includes biodiversity friendly management of stands.	Bi-annual	This indicator includes improved biodiversity friendly management of stands	MOF/PIU
Number of people trained	This indicator refers to the number of forest professionals and or community members that have received capacity building through training as a result of the project	Bi-annual	Bi-annual progress reports	MOF/PIU
Number of people trained - female	This is a breakdown of the total number of people trained	Bi-annual	Bi-annual progress reports.	MOF/PIU
Reforms in forest policy, legislation or other regulations supported	This indicator measures support to forest sector reforms as a result of the project	Bi-annual	Bi-annual progress reports	MOF/PIU
Govt institutions provided with capacity building to improve mgt of forest resources	This indicator refers to the number of national or sub-national institutions (e.g. forest or environmental department and national, state or province level that have received	Bi-annual	Bi-annual progress reports	MOF/PIU

	capacity building as a result of the project.			
New areas outside protected areas managed as biodiversity-friendly (ha)	This indicator measures the number of terrestrial hectares outside protected areas where, as a result of the World Bank operation, the site is managed at least in part to obtain biodiversity gains.	Bi-annual	Bi-annual progress reports	MOF/PIU
Project-supported organization(s) publish reports on inputs and effect of consultation and information dissemination activities on project/program/policies (Yes/No)	This indicator monitors the publication of reports on the results and effects of consultations and information dissemination activities as part of the project.	Bi-annual	Bi-annual progress reports	MOF/PIU
Direct project beneficiaries	Direct beneficiaries are people or groups who directly derive benefits from an intervention (i.e., children who benefit from an immunization program; families that have a new piped water connection). Please note that this indicator requires supplemental information. Supplemental Value: Female beneficiaries (percentage). Based on the assessment and definition of direct project beneficiaries, specify what proportion of the direct project beneficiaries are female. This indicator	Bi-annual	Bi-annual progress reports	MOF/PIU

	is calculated as a percentage.			
Female beneficiaries	Based on the assessment and definition of direct project beneficiaries, specify what percentage of the beneficiaries are female	Bi-annual	Bi-annual progress reports	MOF/PIU

ANNEX 4. Contracts concluded within the project

Contracts for construction of forest nurseries and delivery of machinery and equipment (Main Loan No.8474-BY), components 1,2

	Supplier, country, No. of the contract	Title	Amount delivered as per the contract	Actually paid, USD mln.	To be delivered/ delivered
	COMPONENT 1 Improving silviculture and the sustainability of forest management				
1	Open Joint Stock Society (OJSC) «Polesiezhilstroy" , Belarus, No BFDP/NCB/16/05-1	Complex on production of planting material with closed root system belonging to SFE "Ivatsevichskij forest enterprise"		2.95	Put into exploitation on 11.04.2018
2	OJSC "Stroitel", Belarus, No.BFDP/NCB/16/05-2	Reconstruction of the permanent basic forest nursery of Glubokskij experimental forest enterprise		4.85	Put into exploitation on 01.10.2018
3	OJSC "Minskvodstroj", Belarus, No.BFDP/NCB/16/05-5	Greenhouse complex for production of planting material of the main forest tree species		5.7	Put into exploitation on 30.04.2019
4	Vimek AB, Sweden, No. BFDP/ICB/15/01	Harvesters and forwarders	126 units (100%)	17.88	100% delivery
5 6	OJSC "Amkodor", Belarus, No. BFDP/ICB/15/01-1 No. BFDP/DC/15/01-2	Harvesters and forwarders	16 units	2.65	100% delivery
7	OJSC "Mozyrsky mashinostroitelnyj zavod", Belarus, No. BFDP/Shopping/16/03	Forestry equipment for mechanized cleaning of felling sites (forest rake)	12 units	0.039	100% delivery
8	OJSC " Mozyrsky mashinostroitelnyj zavod", Belarus, BFDP/Shopping/16/02	Automotive chopping machines	2 units	0.817	100% delivery
9	"TRS" Ltd., Belarus, No. BFDP/Shopping/18/05-11	Elevator	1 unit	0.02	100% delivery
10	OJSC "Minsk zavod termoplast", Belarus, No. BFDP/Shopping/18/05-9	Plastics boxes	17 280 units	0.06	100% delivery
11	Unitary Enterprise "Tehnovisa", Belarus, No. BFDP/Shopping/18/05-10	Fork electrical loader	1 unit	0,03	100% delivery
12	"Akitama" Ltd., Belarus, No. BFDP/Shopping/18/05-7	Multi-functional loader	1 unit	0.07	100% delivery
13	Vimek AB, Sweden, No. BFDP/DC/18/01-3	Forwarders	22 units	2.25	100% delivery

14	"Belama Plus" Ltd., Belarus, No. BFDP/NCB/18/05-8	Metal framework	7 000 pieces	0.38	100% delivery
15	"Alianceecoprom" ltd., Belarus, No. BFDP/DC/20/17	Plastics cassette type F100	19 600 pieces	0.05	100% delivery
16	Trade Unitary Enterprise "AgroTeplitsa', Belarus, No. BFDP/DC/20/15	Device for bale disruption, set of exchange modules	1 unit, 1 set	0.0297	100% delivery
17	OJSC "Belmetal", Belarus, No. BFDP/Shopping/20/16	Metal frameworks	3 000 pieces.	0.076	100% delivery
18	OJSC "Novogrudskij zavod metaloizdelij", Belarus, No. BFDP/Shopping/20/18	Metal boxes	127 pieces	0.0235	100% delivery
	COMPONENT 2 Improving forest fire prevention, monitoring, detection and suppression				
19	"Pozhsnab" Ltd., Belarus, No. BFDP/NCB/16/11	Fire trucks	8 units	0.588	100% delivery
20	OJSC "BelGazavtoservis", Belarus, No. BFDP/NCB/16/12	Utility off-road vehicles with cargo platform	31 units	0.34	100% delivery
21	"Pozhsnab" Ltd., Belarus, No. BFDP/ICB/16/13	Off-road vehicles for forest fire protection	31 units	1.7	100% delivery
22	"Miraem" Ltd., Belarus No. BFDP/Shopping/18/14	Video sistem	3 units	0.004	100% delivery
23	Joint Venture "Skanlink" Ltd., Belarus	Fire tank truck	1 units	0.08385	100% delivery
	TOTAL for COMPONENT 1	Delivered within the contracts: **169** units of machinery and **13** units of equipment, 17 407 boxes, 10 000 frameworks, 19 600 cassettes; 3 forest nurseries are built.		TOTAL: USD 38.0 mln.	
	TOTAL for COMPONENT 2	Delivered within the contracts: **71** units of machinery and 3 units of equipment		TOTAL: USD 2.7 mln.	
	TOTAL for Loan No.8474-BY			USD 40.7 mln.	

Contracts for construction of forest nursery and delivery of machinery and equipment (Additional Loan No. 8821-BY), components 1,2

	Supplier, country, No. of the contract	Title	Amount delivered as per the contract	Actually paid (EUR mln.)	To be delivered/ delivered
	COMPONENT 1 Improving silviculture and the sustainability of forest management				
1	OJSC "Stroitel", Belarus, No. BFDP/RFB/18/01-1	Complex on production of planting material with closed root system on the territory of the basic forest nursery of SFE "Mogilevskij forest enterprise" in the village Krasnitsa, 1st. launch complex		2.2	Put into exploitation on 11.09.2020
2.	OJSC "Belama Plus", Belarus, No. BFDP/RFB/18/01-6	Metal frameworks	7 000 pieces	0.343 .	100% delivery
3.	"Alianceecoprom" Ltd., Belarus, No. BFDP/ RFQ/18/01-4	Plastics cassette type F35	30 000 pieces	0.064	100% delivery
4.	"Alianceecoprom" Ltd., Belarus, No. BFDP/ RFQ/18/01-5	Plastics cassette type F64	35 000 pieces	0.074	100% delivery
5.	"Alianceecoprom" ltd., Belarus, No. BFDP/RFQ/18/01-6	Plastics cassette type F100	7 000 pieces	0.0177	100% delivery
6	"Alianceecoprom" Ltd., Belarus, No. BFDP/RFQ/18/01-7	Plastics cassette type 64FD	86 000 pieces	0.2	100% delivery
7	OJSC "Belpromimpex", Belarus, No. BFDP/RFQ/18/01-12	Diesel loader	1 unit	0.0276	100% delivery
8.	BCC AB, Sweden. No. BFDP/DC/18/01-15	Cassettes, 1 set of exchange modules	30 240 pieces, 1 set.	0.095794	100% delivery
9	"Spektrtrading" Ltd., Belarus, No. BFDP/ RFB /18/02-1	Harvesters Komatsu for Grodno region	9 units	3.65	100% delivery
10.	OJSC "Amkodor", Belarus, No. BFDP/ RFB /18/02-2	Harvesters and forwarders for Gomel region	17 units	3.5112	100% delivery
11	"SV Velor" Ltd., Belarus No. BFDP/RFB/18/01-11/1	Telescopic loader with attachments	1 unit	0.07176	100% delivery
12	OJSC "Minsk zavod Termoplast", Belarus, No/ BFDP/ RFB /18/01-9/1	Plastics boxes	40 000 pieces	0.102	100% delivery
13	"Alianceecoprom", Belarus, No. BFDP/RFB/18/01-16	Plastics cassette type 64FD	24 500 pieces	0.0515	100% delivery
14	Republican Bobrujsk Unitary Production Enterprise "Fabrika hudozhestvennyh izdelij", Belarus, No. BFDP/RFB/18/01-14/1	Metal frameworks	2 651 pieces	0.073	100% delivery
15	"Innovatek" Ltd., Belarus, No. BFDP/RFB/18/01-2	Line for filling of cassettes with substrate and seed planting	1 set	0.1955	100% delivery

16	"Alianceecoprom" Ltd., Belarus, No. BFDP/RFB/18/01-13	Plastics cassettes type K-100F	47 000 pieces	0.1059	100% delivery
17	Vimek AB, Sweden, No. BFDP/DC/18/02-3	Harvesters and forwarders	5 units	0.6056	100% delivery
18	"SV Velor", Ltd., Belarus, No. BFDP/RFB/18/01-17/1	Telescopic loader with attachments	1 unit	0.07176	100% delivery
19	"Innovatek" Ltd., Belarus, No. BFDP/RFB/18/01-3/1	Cabinet for cones drying	1 unit	0.114	100% delivery
20	"PP Stok", Ltd., Belarus, No. BFDP/RFQ/18/01-21/2	Racks	1 set	0.033	100% delivery
21	Republican Bobrujsk Unitary Production Enterprise "Fabrika hudozhestvennyh izdelij", Belarus, No. BFDP/RFB/18/01-18/1	Metal frameworks	5520 pieces	0.186	100% delivery
22	"Innovatek" ltd., Belarus, No. BFDP/RFQ/18/01-22/	Dewinger of forest seeds	1 unit	0.030	100% delivery
23	Republican Bobrujsk Unitary Production Enterprise "Fabrika hudozhestvennyh izdelij", Belarus, № BFDP/RFQ/18/01-23	Metal frameworks	1090 pieces	0.0462	100% delivery
	COMPONENT 2 Improving forest fire prevention, monitoring, detection and suppression				
24	Joint Venture "Skanlink", Ltd., Belarus, No. BFDP/RFQ/18/2-1	Vehicle for forest fires extinguishing (tank truck)	1 unit	0.067	100% delivery
25	Joint Venture "Skanlink", Ltd., Belarus, No. BFDP/RFQ/18/2-2	Vehicle for forest fires extinguishing (tank truck)	1unit	0.065	100% delivery
	TOTAL for COMPONENT 1	Delivered within the contracts: 24 harvesters, 7 forwarders, 3 loaders, 259 740 cassettes, 16261 frameworks, 40 000 boxes, 4 units of machinery, 1 set of racks; 1 forest nursery is built		TOTAL: **EUR 11.868 mln.**	
	TOTAL for COMPONENT 2	Delivered within the contracts: 2 vehicles		TOTAL: **EUR 0.132 mln.**	

Contracts for delivery of machinery and equipment (GEF Grant No. TF0A1173-BY), components 1-3

	Supplier, country, No. of the contract	Title	Amount delivered as per the contract	Actually paid (USD million)	To be delivered/ delivered
	COMPONENT 1 Improving silviculture and the sustainability of forest management				
1	"Inchenso" Ltd., Belarus, for SFE "Baranovichskij forest enterprise", No.BFDP/GEF/Shopping/16/08-12/16	Mechanical shovel for soil treatment; root cutter; digging machine	3 units	0.03891298	100% delivery
2	Inchenso" Ltd., Belarus for SFE "Ivatsevichskij forest enterprise", and SFE "Polesskij forest enterprise" №BFDP/GEF/Shopping/16/08-15/17 №BFDP/GEF/Shopping/16/08-16/17 №BFDP/GEF/Shopping/16/08-17/17	Plough, Nizinskij harrow, Krakovskij roll, forest rake	5 units	0.04265875	100% delivery
3	"Safetim" Ltd., Belarus, No.BFDP/GEF/Shopping/45	Sets of individual protection means (overalls, respirators, half-masks to work with chemicals in forest nurseries and for the Enterprise "Bellesozashchita")	81 pieces	0.020007	100% delivery
4	"Pilakos" Ltd., Belarus, No. BFDP/GEF/Shopping/46	Petrol manual sprinklers for forest nurseries	82 pieces	0.04086248	100% delivery
	COMPONENT 2 Improving forest fire prevention, monitoring, detection and suppression				
5	Joint Venture "Skanlink" Ltd., Belarus, Individual entrepreneur A.B.Filimonov No. BFDP/GEF/Shopping/16/16	Mud motor pump, Fire hoses, Combined manual barrels, Knapsack sprayers	6 units 65 units 13units 40 units	0.01117229	100% delivery
6	Trade Enterprise "Aida", Belarus, "Promsvyazdetal" Ltd., Belarus No. BFDP/GEF/Shopping/47	Equipment for testing and repair of fire hoses for the Enterprise "Bellesozashchita"	6 units	0.00495209	100% delivery
7	"Autocenter "Atlant-M" Borovaya" Ltd., Belarus No/ BFDP/GEF/Shopping/48	Vehicle for transportation of equipment and workers of Enterprise "Bellesozashchita"	1 unit	0.02631073	100% delivery
	COMPONENT 3 Building the capacity for sustainable forest management				
8	Vimek AB, Sweden, No. BFDP/GEF/DC/16/33-09/16	Simulators for training of machinists of harvesters and forwarders	2 units	0.16103604	100% delivery
9	OJSC "Upravlyayushchaya compania holding "Amkodor", Belarus, No.BFDP/GEF/DC/16/33-10/16	Simulators for training of machinists of harvesters and forwarders	2 units	0.143	100% delivery
10	"Tsifrovye technologii" Ltd., Belarus, "Astline" Ltd., Belarus, "Friendly" Ltd., Belarus, No. BFDP/GEF/Shopping/16/36	Procurement of office equipment (plotter 1 piece; multifunctional device 1 piece; printer 1 piece; laptop 1 piece; tablet 1 piece; mobile 1 piece; personal computer 2 pieces; external hard drive 2 pieces; portable radio stations 2 pieces)	12 units	0.00604985	100% delivery
11	"Hobby-Park" Ltd., Belarus, No. BFDP/GEF/Shopping/49	Remotely piloted aerial vehicle for Enterprise "Belgosles"	1 unit	0.03926203	100% delivery

	Supplier, country, No. of the contract	Title	Amount delivered as per the contract	Actually paid (USD million)	To be delivered/ delivered
12	"Autocenter Atlant-M-Vostok" Ltd., Belarus, No. BFDP/GEF/Shopping/51	Vehicle for transportation of equipment and staff of Enterprise "Belgosles"	1 unit	0.0330	100% delivery
13	"SV Velor" Ltd., Belarus, "Geoportal" Ltd., Belarus No. BFDP/GEF/Shopping/52	Equipment for forest pathologists (tablets 5 pieces; rangefinder 10 pieces)	15 units	0.024700	100% delivery
	TOTAL			**0.592**	

Contracts for consultancy services (GEF Grant No.TF0A1173-BY), components 1-3

Item No.	Title of the activities	Actually paid, USD million	Notes
	COMPONENT 1 Improving silviculture and the sustainability of forest management		
1.	Identification and creation of a collection of forest woody plants resistant to climate stress, rare and economically valuable wood species on the premises of the National Forest Selection-Seed Production Center (1.3.3)	0.200	Contract concluded with the State Scientific Organization "Institute of Forest of the National Academy of Sciences of Belarus". Contract completed.
2.	Development of computerized accounting of planting materials for development of forest seed and forest nursery bases of forest enterprises (1.3.4)	0.030	Contract concluded with Republican Unitary Enterprise "Belgosles". Contact completed.
	COMPONENT 2 Improving forest fire prevention, monitoring, detection and suppression		
3.	Updating the firefighting zoning of the Republic of Belarus (2.1)	0.030	Contract concluded with the State Scientific Organization "Institute of Forest of the National Academy of Sciences of Belarus". Contract completed.
4.	Creation of the animated commercial in order to strengthen the measures on forest fires prevention and its broadcasting on TV, internet, in cinemas, subway stations and the bus station "Centralny" (2.2.2)	0.049	Contract concluded with 3 Unitary Enterprise "Hepta Group". Contract completed.
5.	A targeted inventory of depleted peatlands and those peatlands that are no longer used for agricultural purposes and that pose a high risk of fires (2.3)	0.100	Contract concluded with the State Scientific Organization "Institute of Forest of the National Academy of Sciences of Belarus". Contract completed.
	COMPONENT 3 Building the capacity for sustainable forest management		
6.	Improvement of the national forest policy with account of requirements set forth in international agreements, of sustainable forest management and use requirements, and principles of biodiversity conservation and mitigation of consequences of climate change (3.1.1.1.)	0.06487	Contract concluded with Belarusian State Technological University. Contract completed.

Item No.	Title of the activities	Actually paid, USD million	Notes
7.	Improvement of the national legislation and the regulatory technical framework of the forestry sector with account of principles of sustainable forest management and use, practice of implementation thereof, and international experience (3.1.1.2)	0.022	Contract concluded with Individual consultant I.A. Kusiankou. Contract completed.
8.	Improvement of the national legislation and the regulatory technical framework of the forestry sector with account of principles of sustainable forest management and use, practice of implementation thereof, and international experience (3.1.1.2)	0.022	Contract concluded with Republican Unitary Enterprise "Belgosles". Contract completed.
9.	Development of methods and techniques for the preservation of biological and landscape diversity during the conduct of forest management activities and forest use (3.1.1.3)	0.052680	Contract concluded with Belarusian State Technological University. Contract completed.
10.	Publication of booklet on implementation of activities of GEF Grant within Forestry Development Project of the Republic of Belarus (3.1.2.2)	0.001406	Contract concluded with "Azhur Group Ltd." Contract completed.
11.	Implementation of specialized forest surveying that takes into account the requirements on climate change adaptation, biodiversity conservation, and expansion of the forest use sphere (3.1.3.1)	0.150	Contract concluded with Republican Unitary Enterprise "Belgosles". Contract completed.
12.	Undertake assessment and monitoring of soil nutrient levels, soil carbon and biodiversity in main felling sites were felling waste in addition to timber has been harvested according to the criteria on developed by the Round Table on Ensuring Sustainable production and Use of Biomass . This will be done on a number of pilot sites with annual monitoring and writing up of results over the lifetime of the project (3.1.3.3)	0.13849975	Contract concluded with Belarusian State Technological University. Contract completed.
13.	Consultancy Services to Develop Strategies and Actions Plans for the Adaptation of the Belarusian Forestry Sector to Climate Change and to Implement the Principles of "Green Economy" (3.1.4)	0.150	Contract concluded with Belarusian State Technological University. Contract completed.
14.	Improvement and testing of a technology for the reconstruction of low-value plantations for the purpose of increasing the share of broadleaved species (3.1.5)	0.0562	Contract concluded with the State Scientific Organization "Institute of Forest of the National Academy of Sciences of Belarus". Contract completed.
15.	Improvement and testing of a technology for the reforestation of drying spruce felling sites for the purpose of creating sustainable plantations (3.1.6)	0.060	Contract concluded with the State Scientific Organization "Institute of Forest of the National Academy of Sciences of Belarus". Contract completed.
16.	Monitoring research into changes in the forest fund in response to climate change, human impacts and forest activity and the development of recommendations for the preservation of plants of natural origin and biological diversity during reforestation, afforestation and forest use (3.1.7)	0.300	Contract concluded with State Scientific Entity "Institute of Experimental Botany named after V.F.Kuprevich of the National Academy of Sciences of Belarus". Contract completed.
17.	: Undertake monitoring and analysis of stands with and without project thinning and removal of felling waste interventions to assess Greenhouse Gas (GHG) emissions reductions (3.1.8)	0.0961666	Contract concluded with Belarusian State Technological University. Contract completed.
18.	Development of the software for collection, processing, storage and provision of forest management information (3.2.1)	0.080	Contract concluded with Unitary Enterprise "Softmax Systems Telemetrii". Contract completed.

Item No.	Title of the activities	Actually paid, USD million	Notes
19.	Development of the "Reforestation Management Information System" (3.2.1.1)	0.100	Contract concluded with Republican Unitary Enterprise "Belgosles". Contract completed.
20.	Development of a subsystem of evaluation and display of forest resources according to their CO2 absorption capacity on the basis of the National Geoinformation System of Forest Management and the Forest Cadaster (3.2.2)	The work is completed using the funds of the state budget within development of Geoinformation system "Lesfond".	
21.	Development of the thematic area in the field of training, retraining and professional development of staff in the forest sector (3.3.1)	0.0075	Contract concluded with individual consultant Yushkevich N.T. Contract completed.
22.	Preparation of booklet on implementation of activities of GEF Grant within Forestry Development Project of the Republic of Belarus (3.3.4)	0.0035	Contract concluded with the consultant O.M.Chabrouskaya. Contract completed.
23.	Development of a system of support for decision-making concerning forest management in radioactive contamination areas, real time informing about the radioactive conditions in the territory of the forest fund (3.4)	0.040	Contract concluded with State Enterprise "Bellesozashchita". Contract completed.
24.	Development of new version of the information system "Radioactive forests contamination. RadFor" (3.4.1)	0.038	Contract concluded with State Enterprise "Bellesozashchita". Contract completed.
25.	Production of information videos on forestry sector of the Republic of Belarus	0.0170	Contract concluded with the individual entrepreneur K.S.Shamardin. Contract completed.
26.	Financial audit 2015-2021	0.015	5 contracts concluded with "BDO" Ltd... Contracts completed.
27.	Consultancy services on development of terms of references for the activities of the project funded from GEF Grant funds	0.010	Contract concluded with individual consultant. Contract completed.
28.	Consultancy services on verification of reports prepared within project activities funded from GEF Grant funds	0.00196	Contract concluded with individual consultant A.V.Vdovichev. Contract completed.
28	Consultancy services for the development of Borrower Implementation Completion and Results report under the project	0.0050	Contract concluded with individual consultant O.M.Chabrouskaya. Contract completed.
	C. TRAINING		
30.	Study tours for the project implementation unit 2015-2020	0.04757771	6 contracts concluded with Unitary Enterprise "Bonus Travel". Contracts completed.
31.	Study tours for the specialists and national experts to study practical experience of forestry management of European countries (15-20 people)	0.04678777	6 contracts concluded with Unitary Enterprise "Bonus Travel". Contracts completed.
32.	Training of staff of the pilot forest enterprise	Training of staff of forest enterprises was done within the contracts for the supply of equipment	
33	Training of operators of multi-operational forest machines on nature-friendly methods of machine driving	Training of operators in forest enterprises was done within the contracts for the supply of equipment	

Item No.	Title of the activities	Actually paid, USD million	Notes
34	Training of specialists of forestry sector, forest science, education and Ministry of Natural resources and Environmental Protection on sustainable forest management and use aimed at improvement of sustainability of forest ecosystems and biodiversity conservation in climate changing conditions	0.01078828	2 trainings organized in 2018, 2020, and 2021
35.	Bank services and other	0.00025097	Bank fee for cash withdrawal for payment of travel expenses and other
TOTAL for the PROJECT, GEF Grant funds USD 2.739726 mln.			

ANNEX 5. Key Results of GEF Grant by Components

During the project implementation, 70 contracts for the procurement of equipment for the amount of USD 0.59 mln. and for the consultancy services for the amount of USD 2.14 mln. were concluded using GEF Grant funds (Annex 4).
Steering Committee was established to assess progress of the implementation of GEF grant activities. The Chairperson of the Committee was First Deputy Minister of the Forestry. List of members of the Steering Committee included 20 people, and namely: representatives of the Ministry of Forestry, Ministry of the Natural Resources and Environmental Protection, public organizations, managers of the Unitary enterprise "Belgosles" and Unitary enterprise "Bellesexport", and Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector. In total 15 meetings of the Steering Committee were held, where all the stages of each activity were considered.

Description of the most important results achieved within each of the project components is given below.

Component 1: Improving silviculture and the sustainability of forest management

Within the component 1 of the project, a very important **activity 1.3.3***: Identification and creation of a collection of forest woody plants resistant to climate stress, rare and economically valuable wood species on the premises of the National Forest Selection-Seed Production Center of the Ministry of Forestry of the Republic of Belarus*, was implemented.

In the result of the work on identification and selection of forms of forest plants resistant to climate stress, and rare and economically valuable tree species, an *ex situ* collection was created with the total area of 3.05 ha. The collection was established on the basis of the National Forest Selection-Seed Production Center, Dvinskaya and Korenevskaya Experimental Facilities of the National Academy of Sciences of Belarus. 1214 seedlings and saplings of more than 35 coniferous and deciduous tree species and their varieties were planted. This ensured depositing of economically valuable genetic material of the tree species for its further use in the selective work and for creation of new varieties. The activity also resulted in preservation of the most productive and adapted gene types in the conditions of the climate changing and invasive diseases caused by the climate change. On a global scale, the creation of such collection will promote increase in efficiency of forestry and sustainable forest management

Equipment, as attachments to the procured, was purchased for the forest nurseries for 3 forest enterprises using GEF Grant funds, in particular: mechanical shovel for soil treatment, root clearing saw, digging machine, plow, Nizinskij harrow, Krokovskij roller, and device for cleaning of felling sites from the felling wastes. Usage of this equipment resulted in improvement of productivity. Labor protection and safety conditions of the staff of forest nurseries were also improved.

Additionally, equipment was procured and delivered to 78 forest enterprises having small-size forest nurseries using GEF Grant funds, which includes: protective sets and sprinklers for treatment with chemical compounds against weeds, for spraying compounds protecting the plants against

pests, and for feeding of the plants and granulated fertilizers. Due to usage of the protective sets and sprinklers, safe working conditions for the staff in the process of treatment with chemicals in forest nurseries are ensured.

Simulators for training of machinists of harvesters and forwarders for forest sector were procured using GEF Grant funds. Regular practical trainings on timber harvesting using multi-operational machinery of new generation are held at the Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector of the Ministry of Forestry. In 2018-2021, 405 specialists of the forest sector were trained.

Component 2: Improving forest fire prevention, monitoring, detection and suppression

Within the component 2 of the project, activity **2.1.:** *Updating the firefighting zoning of the Republic of Belarus, was implemented, which is of key importance.*

In the result of the activity, complex index of fire risk of the forest fund was defined for all legal entities working in the field of forestry. The index is based on the class of natural fire risk of forests, forest coverage of the region, level of forest inflammability, density of population of the region, distribution of forest fund of the region by radioactive contamination zones. Scheme of dividing of territory of the country into 3 forest fire zones is prepared with due regard to: (i) anthropogenic burden; (ii) length of the borders of forest fund with settlements and their remoteness from the forests; and (iii) degree of radioactive contamination and regime of silviculture. 46 legal entities working in the field of forestry are attributed to the I forest fire zone (44% of the total amount of legal entities), 39 entities (34.2%) are attributed to the II zone, and 29 entities (25.4%)- to the III zone.

Based on the data of the forest fire record books, database of fires in the forest fund of the Republic of Belarus for 2001-2015 was developed. The database includes information on forest fires with connection to concrete site: forest enterprise, forestry unit, compartment, sub- compartment, time of fire initiation, cause of fire, and area.

In the result, actual map of the firefighting zoning of the Republic of Belarus was prepared. It was found out that during the last decade the highest amount of fires have been noted in Gomel and Brest regions, and the minimum amount- in Minsk and Vitebsk regions.

Proposals on actualization of forest fire zoning are included into Amendment No.1 to the Technical Code of Common Practice 193-2009 (02080) “Rules of firefighting arrangement of forests of the Republic of Belarus”. Amendment No. 1 is approved by the Resolution of the Ministry of Forestry of the Republic of Belarus No. 6 as of 28 April 2017 and put into operation from 1 July 2017.

Prevention activities through raising public awareness via mass media play the most significant role for prevention of forest fires as actions of the people cause 90% of fires in the forests.

Within the activity 2.2.2*: Creation of the animated commercial in order to strengthen the measures on forest fires prevention and its broadcasting on TV, internet, in cinemas, subway stations and the bus station "Centralny",* social animated video on prevention of forest fires was produced. The

purpose of the video is to ensure propaganda of safe treatment with the forests and draw attention of the public to the necessity of following of rules of proper behavior in the forests.

During the fire dangerous seasons in 2019-2020, the animated video was broadcasted at the TV channels in prime time, in internet, in the cinemas in all the regional centers, in Minsk metro, and at Minsk bus station "Centralny". During this time, about 2 million people were able to see the video.

Broadcasting of the video through different changes for the public will result in behavioral changes of the people in mid-term and draw their attention to the problems of forest protection against fires.

Equipment for testing and repair of fire hoses as well as utility vehicle for transportation of the workers were procured for the Enterprise "Bellesozashchita" using GEF Grant funds. This ensures technical maintenance of fire hoses (drying, rolling to another edge) in the forest enterprises of the sector before the start of top fire season and, consequently, improves preparedness of the forest protection service to the fire fighting.

Component 3: Building the capacity for sustainable forest management

To create favorable conditions for introduction of modern technologies in the forest sector normative and legal, and technical **legislative documents** were actualized using GEF Grant funds. The work was done based on the international practice of forestry management with due regard to the forestry adaptation to climate changes, biodiversity conservation, creation of high productive stands, and effective use of the wood resources.

Modern methods of special forest management planning with the use of new equipment and remotely piloted aerial vehicles were analyzed. Technologies of reconstruction of low value forest stands were tested as well as technologies of reforestation of fellings sites of dried coniferous stands. Inventory of peatlands that have been transferred to the forest fund was done. Influence of removal/ non-removal of felling wastes during commercial fellings and intermediate cuts on the level of carbon emissions in the forest stands was analyzed.

Modern software products were developed. The advanced software products ensure automation of processes in such fields as forest monitoring, forest seed and nursery management, forest restoration, radioactive forest monitoring, and improvement of analysis of forest management planning documentationю

Intensive training of specialists of forest sector to work with new methods and technologies developed within the project was organized. 1700 people gained new knowledge at the trainings and roundtables held within the project. All drafts normative documents were discussed at the workshops and roundtables, with participation of staff of forest enterprises, representatives of scientific and public organizations. Upon completion of 7 project activities, final booklets and instructions for users of new software were published. Booklets and instructions were disseminated among the forest enterprises on paper and uploaded to the internet to the websites of the Ministry of Forestry, Unitary enterprise "Bellesexport", and Unitary enterprise "Belgosles".

To ensure training of high-qualified specialists for the forest sector and improvement of educational process, 11 new program and lectures were developed. This especially vital taking into account fast development and introduction of new technologies in the forest sector, which are also based on the findings accomplished within the project.

Since 2021, the programs are included into educational process of the Republican Center for Improvement of Skills of the Managers and Specialists of the Forestry Sector of the Ministry of Forestry. This ensures capacity building of the forest sector's manpower already in short-term perspective.

Activity 3.1.1.1: *Improvement of the national forest policy with account of requirements set forth in international agreements, of sustainable forest management and use requirements, and principles of biodiversity conservation and mitigation of consequences of climate change.*

The following tasks were addressed within this activity:

– Review of the existing national indicators of SDG 15 and other SDGs related to forestry is done; proposals to supplement or to amend national indicators are prepared; analysis of indicators for achievement of 6 global goals on the forests and 26 related tasks of the United Nations Strategic Plan for Forests 2017-2030 is carried out;
– State program "Belarusian Forest" for 2021- 2025 is developed and approved by the Government (Decree of the Council of Ministers of the Republic of Belarus dated 28.01.2021 No.52). The program is based on the analysis of implementation and target indicators of the previous similar State program. Proposals on revision of the Forestry Development Strategic Plan for 2015-2030 are prepared;
- analysis of international organizations providing technical grant assistance to implement pilot projects with the purpose of achievement of SDGs and UN Strategic Plan is done; project proposals aiming at achievement of SDGs and UN Strategic Plan by the forestry sector for financing by international organizations are elaborated.

Implementation of the State program will facilitate achievement of the Sustainable Development Goal 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" at national level, which was announced at the General Assembly of the United Nations Organization.

Activity 3.1.4: *Consultancy Services to Develop Strategies and Actions Plans for the Adaptation of the Belarusian Forestry Sector to Climate Change and to Implement the Principles of "Green Economy"*

The following draft documents were developed and approved by the Scientific and Technical Council of the Ministry of Forestry as of 28.06.2019 No. 4.:

- Updated Strategy of Forestry Adaptation to the Climate Change up to 2050, and National Action Plan on Forestry Adaptation to the Climate Change up to 2030. The documents were prepared on the basis of the analysis of current practice of forestry operations in the Republic of Belarus;

- National Action Plan on Increase of Greenhouse Gases Absorption by Absorbents (forests, swamps) up to 2030;
- National Action Plan on Introduction of "Green Economy" Principles into the Forestry of the Republic of Belarus up to 2030;
-Long-term Forestry Development Strategy of the Republic of Belarus with Low Level of Greenhouse Gases Emissions up to 2050.

Scenarios and prognoses of forestry development in climate change conditions were evaluated. Proposals on introduction and expansion of use of modern technologies of reforestation, afforestation, and forest fellings facilitating improvement of quality and sustainability of forests were prepared.

In the conditions of "green economy", forestry sector ensures maximum input into improvement of level of people's well-being through production of timber and non-timber products and services and creation of possibilities for income. At the same time, potential of forests as source of ecosystems services is being supported and developed on sustained basis with due regard to the climate change.

Activity 3.1.1.3: *Development of methods and techniques for the preservation of biological and landscape diversity during the conduct of forest management activities and forest use*

Within the frames of the assignment, electronic register of all the specially protected nature territories (nature reserves, nature monuments) allocated in all 98 forest enterprises of the Ministry of Forestry of the Republic of Belarus was compiled. The register is integrated into geoinformation system on the basis of the existing geoportal of the Unitary Enterprise "Belgosles". From the technical point of view the register is databank containing descriptive attributive characteristics of the specially protected nature territories and cartographic images of the sites. Feedback from the non-governmental organizations was received in relation to the databank. On their opinion this is best databank in this field in the Republic of Belarus.

International approaches and initiatives to secure conservation of biological diversity were analyzed, including Bonn Challenge and commitments made at the first Ministerial Roundtable on Forest Landscape Restoration and the Bonn Challenge in the Caucasus and Central Asia in Astana, Kazakhstan; 20 international agreements and conventions related to Belarusian forestry, which were ratified by the Republic of Belarus.

Based on the requirements in the field of biological diversity and provisions of the international agreements and conventions, the following amendments to the state standards of the Republic of Belarus were developed:

- Draft STB 1708 "Sustainable forest management and forest use. Basic requirements" (new version);
- Draft STB "Group certification of forest management and forest use systems. Requirements";
- Draft STB 2157–2016 "Identification of timber and non-timber forest products upon origin. Basic requirements".

Final booklet

About activities of Belarus Forestry Development Project

funded by GEF Grant funds

Content

PROJECT ACTIVITY: Identification and creation of a collection of forest woody plants resistant to climate stress, rare and economically valuable wood species on the premises of the National Forest Selection-Seed Production Center (1.3.3)

Implementation period: October 2017- February 2020

Goal of the activity:

The objective of the assignment is to identify, select and create a collection of forest woody plants resistant to climate stress, rare and economically valuable species that will ensure:

a) storage of economically valuable genetic material of tree species for its further use in breeding and development of new species;

b) preservation of the most productive and adapted genotypes in the conditions of changing climate and invasive diseases caused by climate change;

c) management of rare and endangered species.

Activity is implemented by: State Scientific Organization «Institute of Forest of the National Academy of Sciences of Belarus»

Target audience: specialists of forest enterprises and forestry units; students of High Schools studying forestry; staff of research organizations and educational institutions; civic society; partners from the Eastern European countries

Key results achieved:

In the result of work on identification, selection and reproduction of forms of forest plants resistant to climate stress, and rare and economically valuable tree species, an *ex situ* collection was created with the total area of 3.05 ha. The collection was established on the basis of the National Forest Selection-Seed Production Center, Dvinskaya and Korenevskaya Experimental Facilities of the National Academy of Sciences of Belarus. 1214 seedlings and saplings of more than 35 coniferous and deciduous wood species and their varieties were planted. The collection is represented by:

– climatic stress resistant origin of Scots pine and European spruce, selected as part of provenance trials, and perspective introduced species (*Tilia caucasica* and *Tilia dasystyla*);

– clones of Scots pine with high resin productivity;

– forms of European ash resistant to phytopathogens, and Scots pine genotypes resistant to infectious lodging;

– rare species listed in the Red Book of the Republic of Belarus (Silver fir, Dwarf birch);

- clones of eight natural monuments of national and local significance (English oak, Silver fir, Siberian larch);

– fast-growing and high productive clones and forms of Scots pine, Norway spruce, European larch, Douglas-fir, English oak, European beech, Small-leaved linden, Norway maple, Silver birch (including Black-barked birch and Silver birch 'dalecarlica'), poplars (including Aspen, Simon poplar, White poplar, Petrowskiana poplar, Black poplar, Canadian poplar);

– clones of lyre-shaped, bush and standard forms of Karelian birch, as well as clones with highly veiny timber;

– seeds of coniferous introduced trees (Weymouth pine, Siberian cedar pine and Korean cedar pine, Japanese white pine, Korean fir, Nordmann fir);

– food species (Walnut, Manchurian walnut, Butternut, H**eart-shaped walnut**, Black mulberry);
– 14 varieties of decorative forms of Scots pine, Silver maple, etc.

The created *ex situ* collection is aimed at the preservation of biological and genetic diversity of tree species, increasing the productivity and biological sustainability of forests.



Photo 1. Sampling of vegetation material in the national parks

Brief description of the main results:

On a global scale the creation of such collection will promote increase in efficiency of forestry and sustainable forest management.

The following scientific and technical products were developed in the course of the task, the use of which allowed achieving the main goal of the activity and creation of the *ex situ* collection:

– analytical note about international and local experience of creation of collections of forest plants resistant to climate change, efficiency of means and methods of conservation of forest genetic resources;

– integrated system of criteria and norms for selection of populations, ecotypes and forms of forest tree species with due regard to their value, specifics and need of conservation;

– data obtained during the revision of dendroflora in Belarus aimed at finding new, unique and ornamental forms as well as rare and endangered species, subspecies and some populations of forest tree species;

– database upon genetic and breeding assessments of climatypes of coniferous trees on provenance trials and monitoring of the state of marginal and/or peripheral populations of woody species of Belarus;

– list of genetic (form) variety of priority tree species which are selected in forest ecosystems in Belarus including those in reserves, national parks, forests which are of scientific and/or historical value and nature sanctuaries;

– registers of forms of selection and collection fund of forest tree species, which are fast-growing and high productive, resistant to phytopathogens, and ensure high production of resin;

– updated database of the selected populations, climatypes, species, forms and genotypes existing in natural conditions (*in situ*);

– register of endangered species, subspecies, forms and some populations whose conservation under natural conditions is not effective and application of biotechnologies is desirable.

In general, the *ex situ* collection and its doublets are highly practically oriented products ensuring production of biologically sustainable and economically valuable planting materials. They are also of high scientific importance as they ensure production of initial material for experimental selection and genetic works.

Photo 2. Collection fund *In vitro* of fast-growing and highly productive forms of forest tree species

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https://bellesexport.by/ru/vidy-deyatelnosti/proekt-razvitiya-lesnogo-sektora-respubliki-belarus.html

PROJECT ACTIVITY: Development of computerized accounting of planting materials for development of forest seed and forest nursery bases of forest enterprises (1.3.4)

Implementation period: July 2019 – July 2021

Goal of the activity:
The main objective of the assignment is to develop: (i) new software package "Nursery management" allowing to control production of planting materials in the forest nurseries, to track flow of the material at all the stages, and to calculate cost of production of planting materials; and (ii) new software "Seed management of forest stands" allowing to control and track production of forest seeds, treatment with the forest seeds at all the stages, usage of the collected seeds, exploitation of available seed stands and actual cost of works on seed management.

Activity is implemented by: Republican Unitary Enterprise "Belgosles"

Target audience: specialists of forest enterprises and forestry units involved in seed management and nursery management activities.

Key results achieved:

Until recently, accounting of all the works in the field of nursery and on the forest seed bases were done manually. As the result of this, prognoses of production of planting materials and forest seeds for reforestation were not fully correct. This problem was actual especially last years as the area of lands for reforestation and afforestation and those where the forest was already planted significantly increased. Thus, to ensure efficiency of accounting works and to minimize errors in reporting documentation needed for further decision-making and prompt analysis of the situation, the above-mentioned processes were computerized. Two new software, "Nursery management" and "Seed management of forest stands", were developed.

Due to the new software, all the documents on nursery management are filled in electronically, and all the aggregated documents and reports are generated electronically with further transformation in Word format and printing on paper. All the final documents conform to the requirements of normative and technical documents of the Ministry of Forestry of the Republic of Belarus.

Databases for the above-mentioned software were also developed within the contract. The applications use PostgreSQL и MS SQLServer systems of database management with the possibility of further simple integration with the cartographic application QGIS.

Brief description of the main results:

The software "Nursery management" and "Seed management of forest stands" are used for:
Tracking of planting material production in forest nurseries and further use of the materials at all the stages;
Calculation of the cost of planting material production;
Keeping and control over documentation on seed management;
Generating of aggregated documents and reports.

With the use of the new software, accounting of the following material and financial costs ensured: production, exploitation and harvesting of forest seed raw material and seeds of forest stands; production and usage of the planting material; calculation of demand in seed and plating material for further effective use of the existing objects.

Experimental works were done at 6 forest enterprises (Glubokskij experimental forest enterprise, Shchuchinskij forest enterprise, Krupskij forest enterprise, Mogilevskij forest enterprise, Rechitskij experimental forest enterprise, Ivatsevichskij forest enterprise).

Upon completion of the development and testing, 110 specialists of the forest enterprises responsible for seed and nursery management were trained through videoconference via zoom platform.

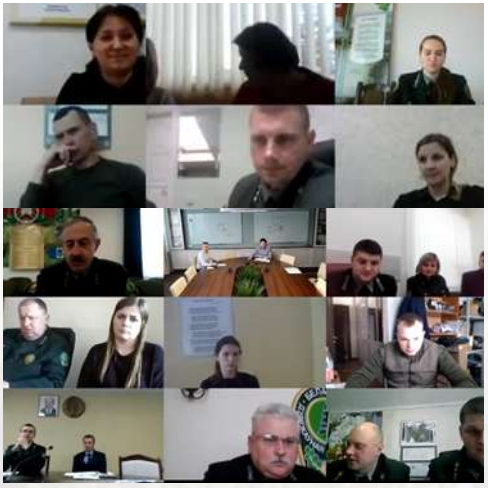

Photo 3. Participants of training on usage of new software

Figure 1. User manual of new software products

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PROJECT ACTIVITY: Updating the firefighting zoning of the Republic of Belarus (2.1)

Implementation period: May **2**016 - May 2017

Goal of the activity:
This activity aims to improve the system of monitoring activities of forest fires and firefighting arrangement of the forest fund, taking into account the updated map of the firefighting zoning. The map is updated on the basis of classes of natural fire risk of forests, forest coverage and population density, level of forest inflammability, distribution of territory of forest fund by radioactive contamination zones.

Activity is implemented by: State Scientific Enterprise «Institute of Forest of the National Academy of Sciences of Belarus»

Target audience: specialists of forest enterprises and forestry units of the Ministry of Forestry and other organizations working in the field of forestry; students of High Schools studying forestry.

Key results achieved:

Complex index of fire risk of the forest fund was defined for all legal entities working in the field of forestry. The index is based on the class of natural fire risk of forests, forest coverage of the region, level of forest inflammability, density of population of the region, distribution of forest fund of the region by radioactive contamination zones. Scheme of dividing of territory of the country into 3 forest fire zones is prepared with due regard to: (i) anthropogenic burden; (ii) length of the borders of forest fund with settlements and their remoteness from the forests; and (iii) degree of radioactive contamination and regime of silviculture. 46 legal entities working in the field of forestry are attributed to the I forest fire zone (44% of the total amount of legal entities), 39 entities (34.2%) are attributed to the II zone, and 29 entities (25.4%)- to the III zone.

In the result, actual map of the firefighting zoning of the Republic of Belarus was prepared. It was found out that during the last decade the highest amount of fires have been noted in Gomel and Brest regions, and the minimum amount- in Minsk and Vitebsk regions. Natural fire risk of the forests of the country is high; average class of natural fire risk is 2,7 out of 5 points scale of assessment of forest types and forest sites of I.S.Melehov. For the conditions of the Republic of Belarus, this scale is modified by I.A.Rihter. Pursuant to the scale, the stands of all forest types, forest lands not covered with the forests, and non-forest lands on the territory of the forest fund are divided into 5 classes of natural fire risk, including: I class is very high fire risk, II class is high fire risk, III class is medium fire risk, IV class is low fire risk, and V class is low fire risk. The division is made based on the potential possibility of fires, time of the fires and type of the fires.

Proposals on actualization of forest fire zoning are included into Amendment No.1 to the Technical Code of Common Practice on firefighting arrangement of forests of the Republic of Belarus that was approved by the Resolution of the Ministry of Forestry of the Republic of Belarus and put into operation from 1 July 2017.

Brief description of the main results:
Key factors used for definition of complex index of fire risk of forests were identified based on the analysis of dynamics of forest fire cases and area for the last decades, fire causes, duration of fire

dangerous season. These key factors are class of natural fire risk of forests, forest coverage of the region, level of forest inflammability, density of the population of the region, distribution of forest fund of the region by radioactive contamination zones.

Based on the data of the forest fire record books, database of fires in the forest fund of the Republic of Belarus for 2001-2015 was developed. The database includes information on forest fires with connection to concrete site: forest enterprise, forestry unit, compartment, sub-compartment, time of fire initiation, cause of fire, and area.

To ensure actualization of forest fire zoning, complex index of fire risk of forests is defined for 98 state forest enterprises of the Ministry of Forestry, and 20 other legal entities working in the field of forestry.

In accordance with requirements of the current legislation, differentiated system of firefighting arrangement of forests includes: creation of system of fire preventive barriers in the form of gaps and screens, and protective mineralized stripes; development of network of roads and reservoirs to ensure prompt transportation of firefighting troops and elimination of the fires. The following should be undertaken to increase fire resistance of the forests: adjustment of composition of coniferous stands in the process of intermediate fellings through preservation of some share of deciduous species; timely intermediate fellings; removal of wood residues from felling sites and cleaning of forests outside felling sites; creation of fire-resistant edges of forest.

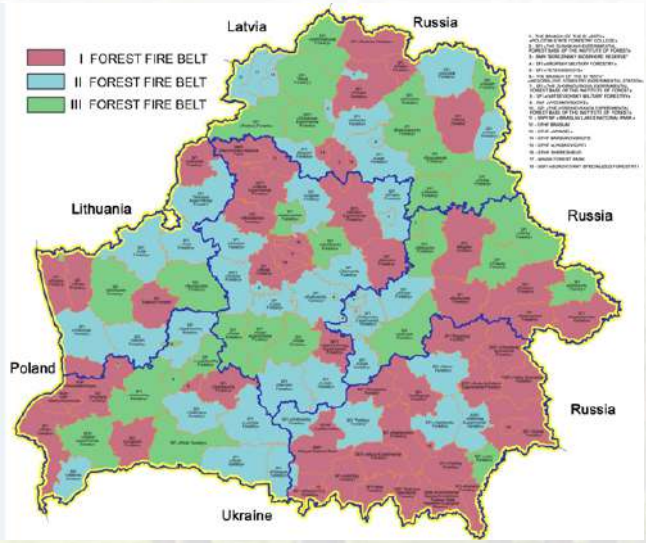

Figure 2. The updated map of forest firefighting zoning of the territory of the Republic of Belarus

Photo 4. 20-meters fire-prevention gap in plantations of the I class of natural fire danger

Photo 5. The mineralized protective strip in plantations of the I-III classes of natural fire danger

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PROJECT ACTIVITY: Creation of the animated commercial in order to strengthen the measures on forest fires prevention and its broadcasting on TV, internet, in cinemas, subway stations and the bus station «Centralny» (2.2.2)

Implementation period: May 2018- May 2020

Goal of the activity:

The main objective of the assignment was to produce animated commercial, and its public broadcasting TV channels, in Internet, in subway, cinemas, schools, to ensure: an informed and careful behavior of the people on the territory of the forest fund; compliance with the fore safety rules in the forests; alerting the state forest protection service in case of forest fires and assistance in fire extinguishing.

Activity is implemented by: Unitary enterprise "Hepta Group»

Target audience: citizens visiting forests; civic society; children and youth; public environmentalists; environmentalists.

Key results achieved:

Produced animated commercial was demonstrated in the republican, regional and district TV channels, in Minsk subway, in Internet, in cinemas, and bus station "Centralny" (Minsk city) during the high fire danger season (April- June 2019, and May 2020). About 2 million people had an opportunity to watch the commercial.

Production of the commercial video is aimed at resolving the following tasks:

- forest fire protection, timely detection and extinguishing of forest fires;
- propaganda of careful attitude towards forest as one of the main natural resources of the country;
- drawing of people's attention to the necessity to comply with the rules of behavior in the forests.

To ensure broadcasting of commercial as social video on republican, regional and district TV channels, agreement of the Intersectoral board on advertising of the Ministry of Antimonopoly Regulation of the Republic of Belarus was received.

Brief description of the main results:

Idea of forest conservation is not innovative itself, however taking into account the big ecological role that the forest play, forest fire protection is becoming really a very important issue. If each of us will follow the required rules of forest fires prevention in Belarus, damage to the forests in the result of fire disaster can be minimized.

In order to minimize forest fire cases caused by the people it is necessary to teach people, inform them on the responsibility that they do bear, and to change people's view of the problem.

Broadcasting animated video for the general public, we can change behavioral insights of people and to draw their attention to the problem of forest fire protection.

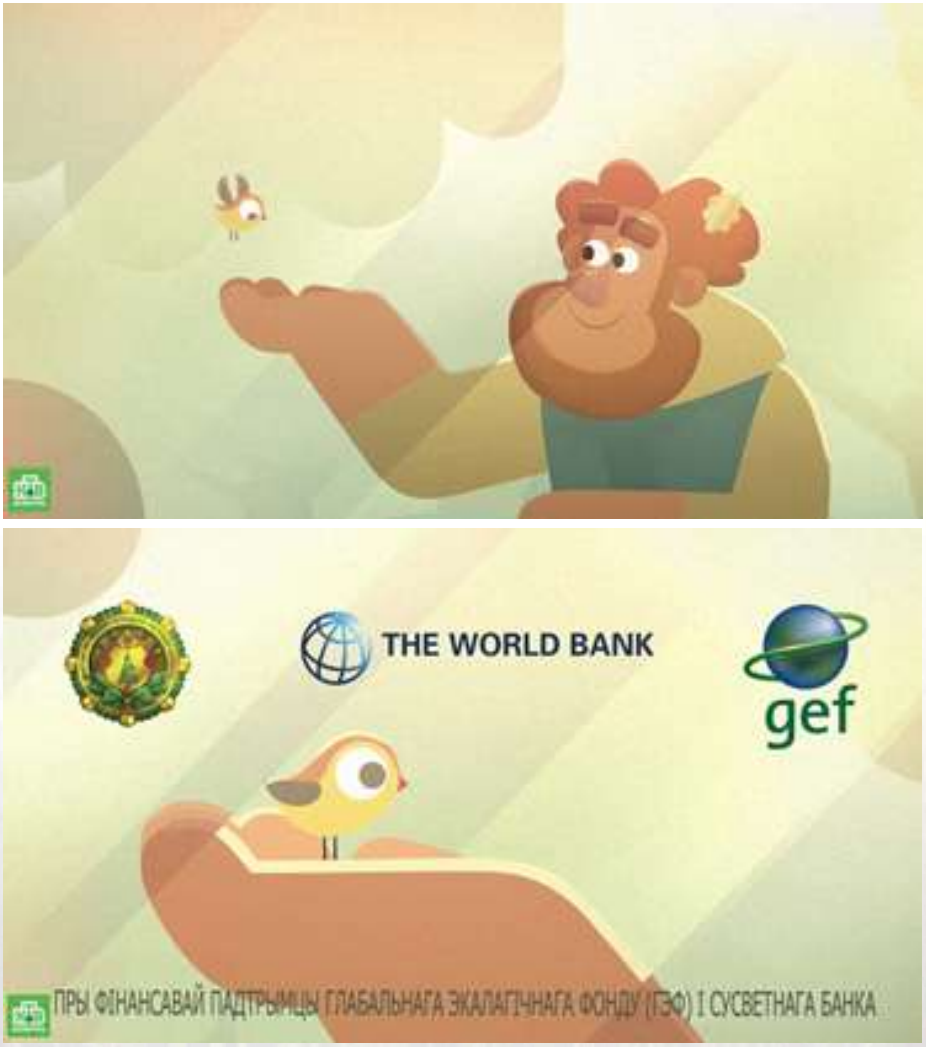

Figure 3. Demonstration of video at the TV channel

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PROJECT ACTIVITY: A targeted inventory of depleted peatlands and those peatlands that are no longer used for agricultural purposes and that pose a high risk of fires (2.3)

Implementation period: September 2018 – November 2019

Goal of the activity:

Objective of the assignment is to undertake an inventory of the peatlands dried for agricultural purposes that were depleted, are no longer used for agricultural purposes and were transferred to the forest enterprises for further use.

Activity is implemented by: State Scientific Entity "Institute of Forest of the National Academy of Sciences of Belarus"

Target audience: specialists of the Ministry of Forestry of the Republic of Belarus; workers of forest enterprises and forestry units having peatlands on their territory; students of High Schools studying corresponding disciplines; other entities working with usage and restoration of peatlands.

Key results achieved:

Inventory of dried peatlands and those inefficiently used in agriculture and for industry purposes, which were transferred to the forest fund, was done.

Area of peatlands transferred to the forest fund after their industrial exploitation and agricultural use was updated. In total, 6679,2 hectares of peatlands were transferred to the forest fund, including 1381,5 hectares of peatlands used in agriculture, and 5297,7 hectares of peatlands after industrial extraction of peat.

Information on 36 sites of peatlands with the area of 10 and more hectares that are not used any more in agriculture or after industrial peat extraction, which have been transferred to 24 forest enterprises starting form 2008, was added to the database "Belarusian Peatlands".

Using functionalities of the mentioned database, allocation of concrete peatland that has been transferred can be seen on the map of Belarus.

Upon results of the study, proposals on minimization of fire risks and improvement of forestry management efficiency were prepared for each concrete peatland.

Brief description of the main results:

The following data was added into the database "Belarusian Peatlands" (peatlands.by) on 24 forest enterprises:

location of the site (forestry unit, forest compartment);
Administrative supervision of the site;
Year of the site transfer;
Average class of fire risk of the site;
availability of hydro-technical devices on the site;
general description of the conditions of the site and its utilization;
technical conditions of meliorative systems and hydro-technical devices at the site;
data on whether meliorative systems and separately located hydro-technical devices are duly registered at the balance of forest enterprise;
assessment of necessity of accounting of meliorative systems and hydro-technical devices as assets belonging to the forest enterprise;
area of peatland transferred (in hectares);
depth of the peat left (in meters);

ground water level (in meters);
Recommendations on usage of the site.

The findings of the study show that mainly low productive lands were transferred to the forest fund, e.g. Depleted peatlands after industrial use and dried peatlands inefficiency used in agriculture. Re-wetting processes are observed on these lands, and the sites are hardly accessible and difficult for effective silviculture.

Analysis of fire preventive measures for each peatland was made. Schemes of organization of territory to minimize risk of fires for each peatland were developed.

42 sites for water taking and 5 firefighting reservoirs should be established on the peatlands transferred to the forest enterprises to ensure minimization of risk of fires. It was defined that the best way to prevent fires of the dried peatlands is to rise water level till the surface level and above. This can be done on the majority of the sites through repair of the pipes of water regulating devices.

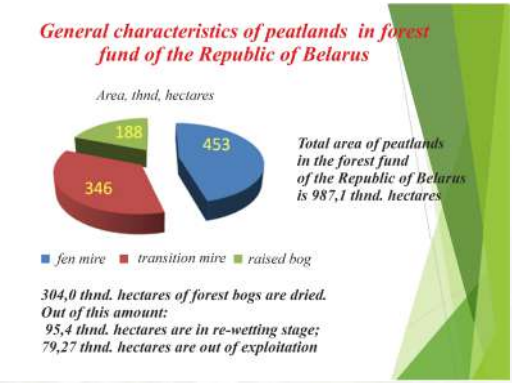

Figure 4. General characteristics of peatlands in forest fund

Photo 6. Peatland transferred to Lidskij forest enterprise, which can be used for traditional silviculture

Figure 7. Peatland transferred to Stolbtsovskij forest enterprise and recommended for re-wetting

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PROJECT ACTIVITY: Improvement of the national forest policy with account of requirements set forth in international agreements, of sustainable forest management and use requirements, and principles of biodiversity conservation and mitigation of consequences of climate change (3.1.1.1)

Implementation period: September 2019 - July 2020

Goal of the activity:

Overall objective of the assignment is improvement of legislation and forestry policy with due regard to the Sustainable Development Goals (hereinafter- SDGs). The specific goals of the assignment are: (i) development of criteria to assess progress of implementation of the SDG 15, and specifically for indicators related to the forestry sector; (ii) preparation of proposals on achievement of indicators of other Sustainable Development Goals that are directly or indirectly connected to the forestry sector; (iii) development of indicators for achievement of 6 global goals on the forests and 26 related tasks of the United Nations Strategic Plan for Forests 2017-2030; and assistance with the reporting on the input of Belarusian forests in achievement of these goals; (iv) development of draft State program for 2021- 2025 "Belarusian Forest" with regard to the indicators of SDGs; and (v) elaboration of at least 10 project proposals aiming at achievement of SDGs by the forestry sector for financing by international organizations.

Activity is implemented by: Belarusian State Technological University

Target audience: specialists of forest enterprises and forestry units of the Ministry of Forestry and other organizations working in the field of forestry; students of High Schools; civic society organizations.

Key results achieved:

– Review of the existing national indicators of SDG 15 and other SDGs related to forestry is done; proposals to supplement or to amend national indicators are prepared; analysis of indicators for achievement of 6 global goals on the forests and 26 related tasks of the United Nations Strategic Plan for Forests 2017-2030 is carried out (hereinafter "The UN Strategic Plan");

– State program "Belarusian Forest" for 2021- 2025 is developed and approved by the Government (Decree of the Council of Ministers of the Republic of Belarus dated 28.01.2021 No.52). The program is based on the analysis of implementation and target indicators of the previous similar State program. Proposals on revision of the Forestry Development Strategic Plan for 2015-2030 are prepared;

- analysis of international organizations providing technical grant assistance to implement pilot projects with the purpose of achievement of SDGs and UN Strategic Plan is done; project proposals aiming at achievement of SDGs and UN Strategic Plan by the forestry sector for financing by international organizations are elaborated.

Brief description of the main results:

The goal of the State program "Belarusian Forest" for 2021-2025 if to improve efficiency of use and reproduction of forest resources on the basis of ecologically and socially oriented forest management, forest use, and hunting management.

The tasks of the State program are as follows:

Improvement of accounting of forest resources ensuring increased efficiency of forest

management on the basis of non-exhaustible forest use;

Development of forest reproduction and management system aimed at conserving biological diversity and increase of sustainability against climate change consequences;

Sustainable forest use to ensure protection and strengthening of ecological and social forest functions;

Development of market of services in the field of silviculture and forest harvesting works;

Full use of wood resources within the annual approved allowable cut;

Ensuring deeper processing of wood resources and increase of share of products with high added value;

Development of road and transport network in forest, and increase of accessibility of forest resources to meet requirements of production in raw materials and to ensure ecosystem services;

Sustainable hunting management based on optimization of number of hunting animals and creation of conditions to meet demands of people in hunting, hunting products and recreation related to hunting to maximum extent.

Implementation of the State program will facilitate achievement of the Sustainable Development Goal 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" at national level, which was announced at the General Assembly of the United Nations Organization.

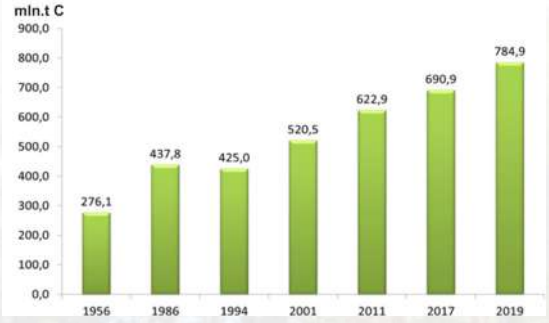

Figure 5. Dynamics of the total amount of carbon in phytomass of the stands

The following results will be achieved till 2025:

Forest coverage of the territory of the Republic is 40,3%;

Timber harvesting is increased till 3,2 cubic meters per 1 hectare;

Average growing stock is increased till 230 cubic meters per 1 hectare;

Not less than 500 km of new forest roads are built;

Population of elk is 93% in comparison with the optimum number, population of red deer is 34%, and number of roe deer is 71%.

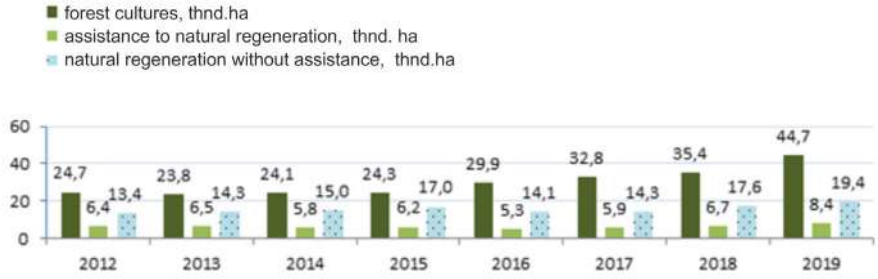

Figure 6. Reforestation area, thnd.ha

Years	1944–1945	1946–1950	1951–1958	1959–1970	1971–1980	1981–1990	1991–2000	Sub-total for 1944–2000	2001–2005	2006–2010	2011–2015	2016–2019	Sub-total for 2001–2019	Total
Area of forest cultures created, thnd. ha	3,4	198,4	372,7	582,9	371,6	273,8	221,7	2 024,50	190,2	189,3	115,5	143,9	638,9	2 663,40

Figure 7. Area of forest cultures created

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PROJECT ACTIVITY: Improvement of the national legislation and the regulatory technical framework of the forestry sector with account of principles of sustainable forest management and use, practice of implementation thereof, and international experience (3.1.1.2)

Sub-task: Improvement of the forest management planning system in the Republic of Belarus

Implementation period: January 2016 - December 2017

Goal of the activity:
To improve the system of forest management planning in the Republic of Belarus based on international experience; to prepare proposals for development of competitive environment for services on elaboration of forest management plans (including collection of field data) to ensure improvement of economic effectiveness and quality of forest management planning activities.

Activity is implemented by: Individual consultant I.A. Kusiankou

Target audience: specialists in the field of forest inventory; staff of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; workers of research organizations and educational institutions; civic society; partners from other countries of Eastern Europe.

Key results achieved:

Integral part of any process of improvement of legislation is permanent study and monitoring over new technologies of forest inventory and management, usage of digital methods of collection and processing of data in the developed countries and introduction of these technologies in the process of forest management in Belarus, endorsement of technologies that were tested in practice by legislation.

Analysis and evaluation of effectiveness of the current system of forest management planning in the Republic of Belarus were done in order to identify challenges of the current forest management system, including analysis of forest legislation of Belarus in the field of forest management and planning, and questioning of forest enterprises, Unitary Enterprise "Belgosles" (responsible for forest management and inventory), Ministry of Forestry and other stakeholders. Appropriate results and conclusions were elaborated and presented.

Proposals in the following fields were developed: (i) improvement of forest management system in the Republic of Belarus; (ii) introduction of new and updating of the currently used technologies of forest management in Belarus with due regard to the international experience; (iii) usage of modern measuring forest inventory instruments in the course of forest management. All the proposals are based on the peculiarities of forestry organization in the Republic of Belarus and economic effectiveness of their use.

International experience of different countries on organization and implementation of forest management, in particular concrete leading countries in the field of forest management such as Finland, Sweden Czech Republic, and Poland, was made on the basis of internet sources and resulted in formulation of the proposals mentioned above. Analysis of the main achievements in the forest management (technologies, methods, techniques) was also done.

Additionally, the following was analyzed on the basis of the internet data: technologies of collection of field data (selective method and field measurement of the areas) available in the world

and used in the developed countries; usage of different available sources of data (satellite images, digital aerial photographic images, LIDAR, digital surface models, GIS systems and databases, etc.); systems of data storage and processing; software.

Analysis of positive and negative aspects of functioning of market for forest management and planning services was completed. Analysis was made for the countries, where the peculiarities of such markets are clearly visible, e.g. countries, where access to the market does not have any legislative and regulative barriers; countries, where such barriers exist, but there is competitiveness; and countries, where only one state owned organization has the right and is responsible for forest management and planning as per the national legislation. Recommendations in this field were developed for Belarus based on the analysis.

Study of legislative, economic, and administrative possibilities to build-up service industry in the field of forest management and planning in Belarus was made. In particularly, overview of Belarusian legislation and general legislation of Eurasian Economic Union (Belarus, Russia, Kazakhstan, Armenia, Kyrgyzstan) was prepared.

Analysis of advantages and disadvantages of functioning of competitive environment in the field of forest management and planning in Belarus was made. Assessment of general impact at the quality of forest management and increase of economic efficiency was also accomplished. Recommendations on possibilities of development of competitiveness, ways of its development taking into account specifics of forest management in Belarus were prepared.

Draft roadmap for transition to competitive and effective market of services in the field of forest management and planning was elaborated and includes possible optimum time, methods and process of transition. Responsible specialists for each stage of the transition were proposed.

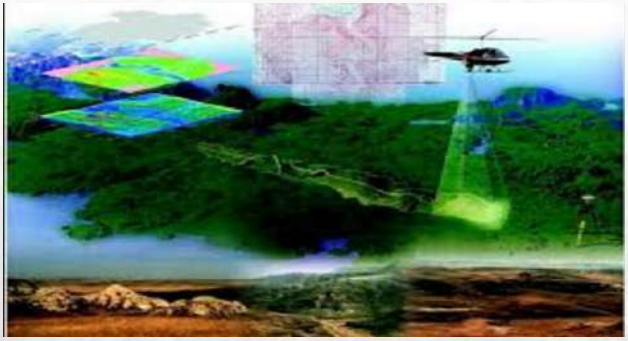

Figure 8. Air laser scanning of the earth surface LIDAR

Brief description of the main results:

Results of the work can be used by the Ministry of Forestry, Unitary Enterprise "Belgosles", other institutions as basic materials for improvement of organization of forest management system.

In case of development of market services in the forest management system, the following should be clearly regulated by legislative documents:

Requirements to entities that will be engaged in forest management in relation to their technical and technological equipment, staff;

Unified technologies of forest management and methods of forest inventory for all the market players;

Unified approaches to organization of forest management, including organization of competitions, tenders, etc.;

Transfer of forest management data and its integration in one common center;

Control over implementation of forest management works, acceptance, approval and put into action of forest management materials;

Survey over implementation of the developed forest management plan during the revision period.

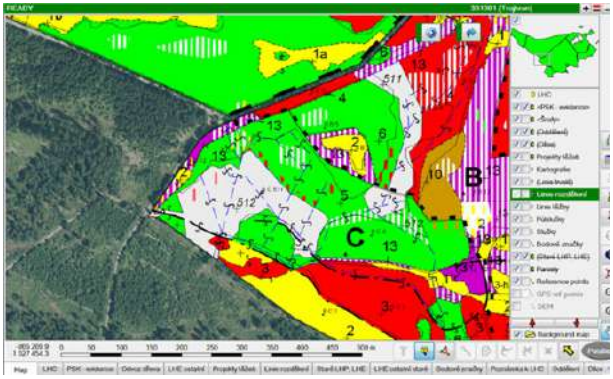

Figure 9. Mapping using software Field-Map

Figure 10. View of the forest stands and felling site from the camera of the remotely piloted aerial vehicle

In the result of the study of international experience on organization and implementation of forest management it was found out that two-levels organizational model of forest management is used in many country, and similar in the Republic of Belarus:

1. National forest inventory;
2. Forest planning (classic forest management).

Accelerated introduction of technologies that will result in positive economic effect in short term is the most desirable way for our country. These technologies include automatic decoding of pictures, expansion of use of the remotely piloted aerial vehicles, renewal of software similar to the software that was considered and recommended such as Field-Map, ArcGIS.

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PROJECT ACTIVITY: Improvement of the national legislation and the regulatory technical framework of the forestry sector with account of principles of sustainable forest management and use, practice of implementation thereof, and international experience (3.1.1.2)

Sub- task: Improving the system of forest monitoring in the Republic of Belarus

Implementation period: March 2016 – April 2017

Goal of the activity:
to improve the system of monitoring in the Republic of Belarus based on international experience;
to improve the quality of monitoring over the forest conditions;
to introduce new technologies, which proved to be efficient in the developed countries, to ensure prompt implementation (if deemed to be necessary) intensive silviculture methods and other actions that will minimize negative impact at the forests in the result of the climate change and economic activities.

Activity is implemented by: Republican Unitary Enterprise "Belgosles"

Target audience: specialists of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; staff of research organizations and educational institutions; civic society; partners from other countries of Eastern Europe.

Key results achieved:

To ensure improvement of the forest monitoring system of the Republic of Belarus the works were done under the following directions:
Analysis of dynamics of the main qualitative and quantitative indicators of the conditions of the forest fund of the Republic of Belarus for the last 10 years;
Analysis of monitoring over conditions and transformation of the forest fund of the country due to the impact of the changing of climatic conditions and economic activities for the last 10 years;
Study of the problematic issues of the current forest monitoring system with involvement of all the stakeholders. Collection of the material and its analysis;
Study of the best international experience in organization and implementation of the forest monitoring (by the example of the leading countries in the field of forest management such as Finland, Sweden, Czech Republic, Russian Federation, Republic of Poland);
Preparation of proposals on improvement of forest monitoring system in the Republic of Belarus to ensure minimization of negative impact of the changing climatic conditions and economic activities at the forests;
Development of proposals on improvement of normative, legal and technical framework regulating forest monitoring system. Proposals have been integrated into Regulation on organization of forest monitoring and usage of monitoring data, which was approved by the Resolution of the Government as of 04.11.2016 No. 907.

Brief description of the main results:

Since 1989, Unitary Enterprise "Belgosles", which is in the structure of the Ministry of Forestry, is responsible for forest monitoring in our country. Forest monitoring is an integral part of the

National Environmental Monitoring System of the Republic of Belarus functioning in line with the Regulations on National Environmental Monitoring System of the Republic of Belarus.

Forest monitoring is done under the following directions:

General conditions of the forest, including under the impact of atmospheric air pollution (*monitoring over forest conditions*);

Conditions of the forest under the impact of harmful insects and diseases (*forest pathological monitoring*);

Conditions of the forest under the impact of meliorative activities (*ecological and meliorative monitoring of the meliorated forest lands).*

In the last decade mainly, positive changes are noted in the forest fund of the country, including increase of the area of forest lands and forest coverage. However, forest distribution on the territory of the country is uneven.

Coniferous forest stands prevail in the Republic of Belarus (59,6% of forest land); soft-leaved stands cover 36,4% of forest land; and hard-leaved forest stands cover 4,0% of forest land.

The most intense climate changes on the territory of Belarus are noted since the end of 1980 years. In the last decades average air temperature increased climatic norm by 1,1°C.

Since 1980 years amount of precipitations on the territory of Belarus is slightly reduced. At the same time, unevenness of precipitations during the year and during different years increased in the stated warming period. Decrease of amount of precipitations and their unevenness, especially in combination with increase of air temperature, leads to increase of droughts. Consequently, droughts are observed in this period twice as much as during previous years.

One of the most severe droughts for all the history of meteorological observations was registered on the territory of the Republic of Belarus in 2015. Due to hot and dry weather, the year 2015 happened to be the most fire dangerous.

Changes of climatic conditions result in direct or indirect impact at forest conditions through change of the level of ground waters, forest pests dissemination, and intensification of forest diseases. Drying of forests is considered to be one of the most visible consequences of climate change. In the last decade, in average 8.8 thousand hectares of forests died annually due to the impact of different natural and climatic factors.

Figure 11. Monitoring points over the forest conditions and prevailing forest species at the sites

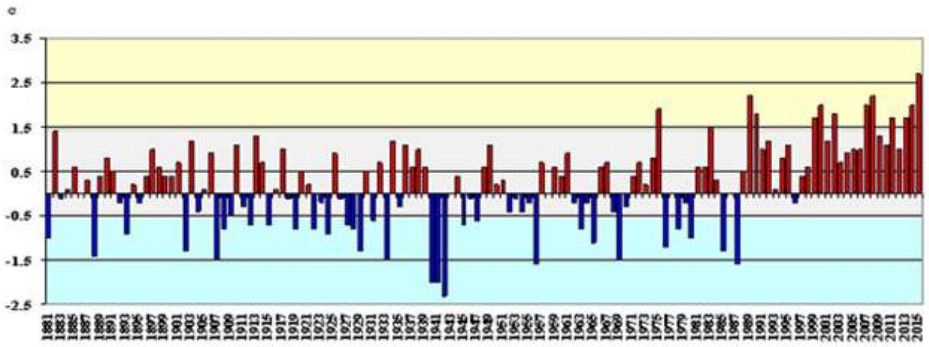

Figure 12. Deviation of average annual air temperature in comparison with the seasonal norm (+5.8°C) on the territory of the Republic of Belarus

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Link to the final report in English:

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PROJECT ACTIVITY: Implementation of specialized forest surveying that takes into account the requirements on climate change adaptation, biodiversity conservation, and expansion of the forest use sphere (3.1.3.1)

Implementation period: July 2018 - April 2020

Goal of the activity:

Objectives of the assignment were: (i) development and introduction of new approaches on assessment of climatic changes influencing the structure and conditions of forests in the course of forest management with the purpose to create sustainable and productive forests with conservation of biodiversity; (ii) testing of new technology of forest assessment through interpretation of stereoscopic photos; (iii) testing of use of the remotely piloted aerial vehicles in the process of forest inventory, and development of technology of processing of data received from the remotely piloted aerial vehicles in order: (a) to make changes to the forest management plans with due regard to the climate change adaptation; (b) to organize operative monitoring in case of emergency situations; (c) to conduct forest pathological study of the forest stands, etc.; (iv) study of possibility of introduction of new method of forest management that is stratification of forest by sites of the similar characteristics, for which similar silvicultural operations are defined.

Activity is implemented by: Unitary Enterprise "Belgosles"

Target audience: specialists in the field of forest inventory; staff of forest enterprises and forestry units of the Ministry of Forestry responsible for implementation of forestry management plans; students of High Schools studying forestry management and planning; staff of research organizations and educational institutions.

Key results achieved:

Climatic changes and sanitary and remedial operations carried out on the territory of two pilot forest enterprises (Puhovichskij forest enterprise and Starobinskij forest enterprise) in the last 10 years (revision period of forest management plan) were analyzed as there are severely damaged forest stands on the territory of these enterprises.

Actions on adaptation of forest stands to climate change and biodiversity conservation for further inclusion into the forest management plans of two pilot forest enterprises were developed.

Proposals on taking of the sites under protection were prepared. Technological instructions with the results of the research of forest sites on the territory of two pilot forest enterprises on their conformity to the criteria of nature protection territories were developed.

5 permanent sample plots in the most vulnerable forest types to monitor consequences of the climate change in the forest ecosystems were set up.

Methods of processing of data received from special digital camera ADS 100 (Airborne Digital Sensor) were studied, which allowing definition of the main characteristics of the stands without visiting forests in the process of forest inventory using technology of interpretation of stereoscopic photos, and with the help of software Photomod. Field trainings for the purpose of forest assessment and decoding were held on the territory of two pilot forest enterprises (Smolevichskij forest enterprise and Volozhinskij forest enterprise). Data received using technology of interpretation of stereoscopic photos with the data received during field study of the same forest sites with the help of ocular method was compared. Final technology of analytical and measurement decoding for receiving of the main characteristics of the stands in the process of forest inventory was completed.

Technology of use and processing of data received with the help of remotely piloted aerial vehicles for prompt detection of the areas of died and drying forests stands in the result of disasters was studied. Sites of the damaged and depressed forest stands were photographed on the territory of Lyubanskij and Starobinskij forest enterprises with the help of the most commonly used in Belarusian conditions types of the remotely piloted aerial vehicles.

Method of forest management that is stratification of forest by sites of the similar characteristics, for which similar silvicultural operations are defined, was analyzed, including its advantages in comparison with traditional methods. Permanent forest sites of the similar characteristics were allocated on the territory of Gravzhisjskoye forestry of Smorgonskij experimental forest enterprise. Methodology of organization of forest sites of the similar characteristics within forest management method envisaging stratification of forest by sites of the similar characteristics was prepared.

Brief description of the main results:

Forestry adaptation to climate change is targeted first of all at optimization of species composition of the stands in the process of reforestation and afforestation and during intermediate cuts when forest stands of concrete species composition are formed.

Specialized forest management methods were worked out on the basis of two pilot forest enterprises, Puhovichskij and Starobinskij forest enterprises.

Currently, materials of aerial photography made with the digital camera ADS 100 (Airborne Digital Sensor) make technical basis for forest inventory works. With more profound usage these materials can be used for definition of the main characteristics of the forest stands without visiting the forest. In the result of this assignment, technological instructions for engineers responsible for forest assessment on technology of interpretation of stereoscopic photos in the process of forest inventory works were developed. Instructions include consequence of actions (stages) while assessment of standing volume and characteristics of the trees of sub-compartment using the method of analytical and measurement decoding.

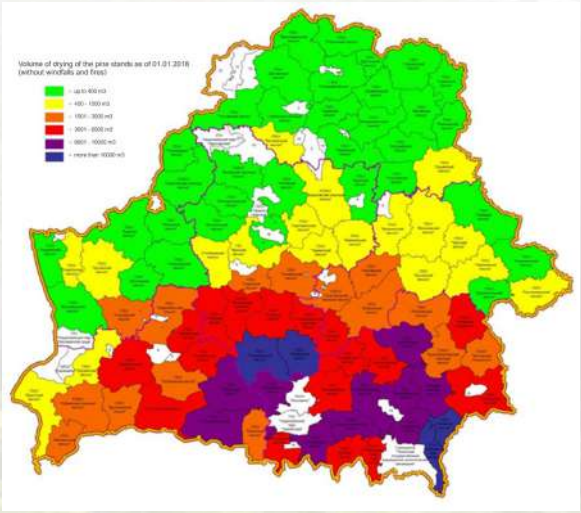

Figure 13. Volume of drying of pine stands in year 2017, м^3/1000 ha as per data of the Unitary Enterprise "Belgosles"

Technical characteristics of two types of remotely piloted aerial vehicles (aircraft and helicopter) were studied with the purpose to define areas of died and damaged forest stands. Piloting was done to ensure monitoring over forest conditions and aerial photography in two pilot forest enterprises with the help of the mentioned vehicles. Technology of usage of the program complexes on definition of the borders and areas of the damaged sites was developed.

Application of forest management method that is stratification of forest by sites of the similar characteristics, for which similar silvicultural operations are defined, within the current organization and production conditions of forestry operations in the Republic of Belarus was considered. Amendments to the legislative documents, which can ensure organization and implementation of the forest management method using stratification of forest by sites of the similar characteristics, were drafted.

Trainings on methods and approaches of special forest management were held using results of the assignment to ensure their practical usage.

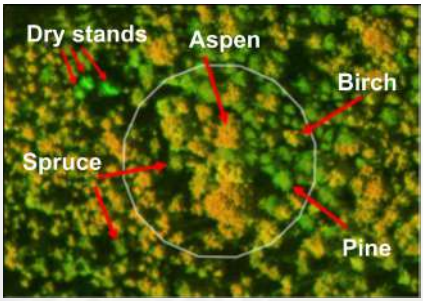

Figure 14. Example of decoding of species composition of forest stands at the digital aerial photo

Figure 15. Montage of the pictures of areal object by putting blocks on each other. Pictures of the object were made with the help of software installed at the remotely piloted aerial vehicle

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PROJECT ACTIVITY: Undertake assessment and monitoring of soil nutrient levels, soil carbon and biodiversity in main felling sites were felling waste in addition to timber has been harvested according to the criteria on developed by the Round Table on Ensuring Sustainable production and Use of Biomass . This will be done on a number of pilot sites with annual monitoring and writing up of results over the lifetime of the project (3.1.3.3)

Implementation period: August 2018 - December 2019

Goal of the activity:

The objective of the assignment is analysis, obtaining of reliable data and preparation of proposals on conservation of biodiversity and minimization of carbon dioxide emissions in the process of implementation of different types of commercial cuts with due regard to the balance of social, ecological and economic aspects of forest utilization.

Activity is implemented by: Belarusian State Technological University

Target audience: specialists of the governmental bodies; staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe.

Key results achieved:

International experience of Canada, Finland, Sweden, Germany and Russia on treatment of felling wastes after commercial feelings was studied.

16 pilot sites of commercial cuttings (clear and non-clear) in the stands of two main forest species (pine and spruce) and by the main forest types were laid out. Timber harvesting is done using felling wastes and without using felling wastes on the established sites. Analysis of carbon flows, biodiversity conservation level, nutrients content in the soil, in forest litter and phyto mass is done on the pilot sites.

Methodology of assessment of carbon sequestration by the felling wastes in the process of commercial cuts (clear, non-clear) was prepared. Recommendations and complex of actions on biodiversity protection, optimum content of nutrients and minimization of carbon dioxide emissions at the sites after clear and non-clear commercial cuts, and on treatment with felling wastes upon results of monitoring, with due regard to the balance of social, ecological and consumption interests of forest use were also developed.

Proposals on actualization of the legislation on treatment with felling wastes were developed.

Brief description of the main results:

Mitigation of negative consequences of commercial forest cuts in relation to the reduction of carbon dioxide emissions and biodiversity conservation is based on the selection of ecologically friendly methods of forest fellings and reforestation, removal and non-removal of felling wastes, technologies of harvesting works.

Considerable part of nutrients are taken by the forest stands from the deeper layers of the soil. Consumption is also partly replenished through annual tree wastes, which form forest litter.

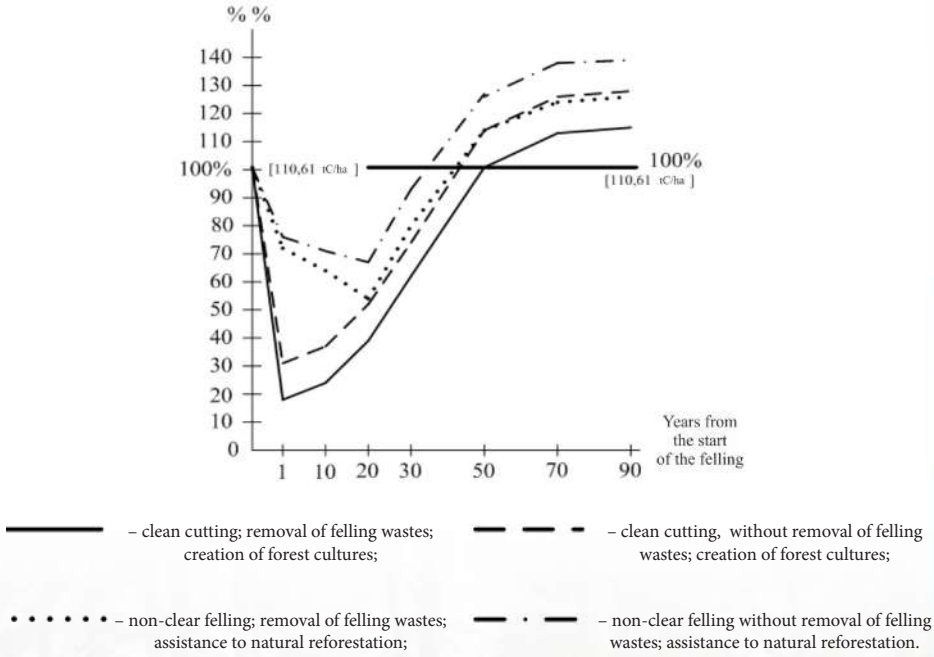

Figure 16. Dynamics of carbon content during the felling cycle (phyto mass plus forest litter) during different methods of fellings, reforestation, and with and without removal of felling wastes

In the result of observations, it was found out that removal of felling wastes reduce elements of soil nutrition by not more than 10%, does not have considerable impact at soil productivity and at the satisfaction of nutrient demand of the young forest that is regenerated.

However, taking into account regular loss of nutrients in the process of intermediate and sanitary cuts, it is advisable to limit removal of forest felling wastes in the stands growing on the poor soils. This is also favorable for protection of forest biodiversity and sequestration of part of carbon in phyto mass and soil. At the same time, risk of forest fires increases as well as risk of spots of spreading of forest pests and diseases.

Important stable trend of forest ecosystem of sequestration of organic carbon in the soil, and in lesser extent in forest litter, was discovered. This is typical for normally growing forests as well as for drying stands.

Usage of felling wastes for heat purposes is economically justified in case if customer is situated up to 100 km from the sites. It should be noted that such utilization of felling wastes results in: reduction of emissions of hazardous substances into the air; decrease of risk of forest fires and spots of forest pests; increase of level of employment of population due to involvement of the people as manpower at the enterprises of energy sector.

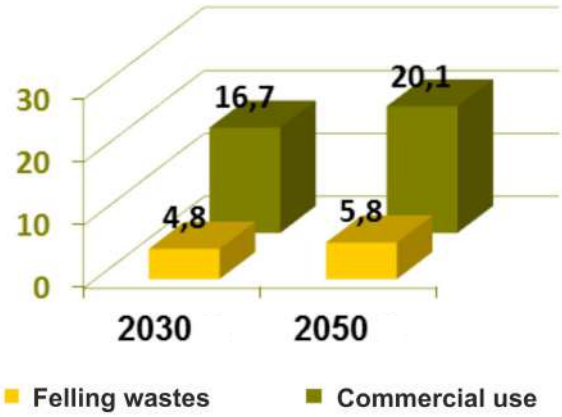

Figure 18. Volume of felling wastes by groups, mln.m^3/%

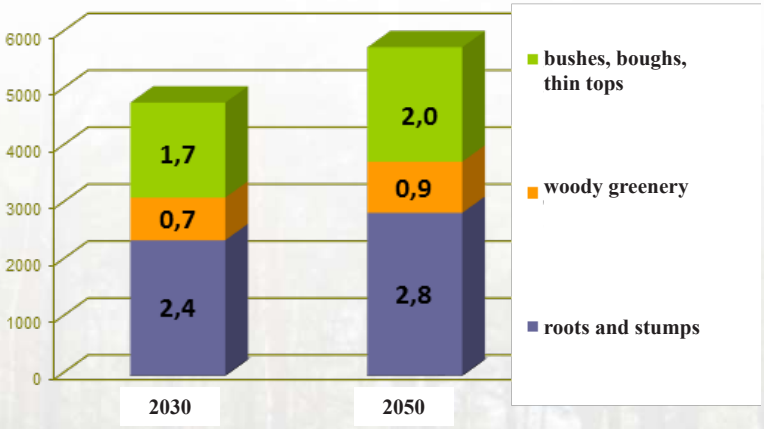

Figure 18. Volume of felling wastes by groups, mln.m^3/%

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PROJECT ACTIVITY: Consultancy Services to Develop Strategies and Actions Plans for the Adaptation of the Belarusian Forestry Sector to Climate Change and to Implement the Principles of "Green Economy" (3.1.4)

Implementation period: October 2017 - March 2019

Goal of the activity:

The objective of this assignment was updating and development of strategies and action plans on adaptation of Belarusian forestry to the climate change, increase of greenhouse gases absorption, and introduction of "green economy" principles.

Activity is implemented by: Belarusian State Technological University

Target audience: specialists of the governmental bodies; staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe.

Key results achieved:

Proposals on amendments to the legislation of the Republic of Belarus to ensure introduction of "green economy" principles into the forestry were prepared, and the following documents were elaborated:

- Updated Strategy of Forestry Adaptation to the Climate Change up to 2050, and National Action Plan on Forestry Adaptation to the Climate Change up to 2030. The documents were prepared on the basis of the analysis of current practice of forestry operations in the Republic of Belarus;
- National Action Plan on Increase of Greenhouse Gases Absorption by Absorbents (forests, swamps) up to 2030;
- National Action Plan on Introduction of "Green Economy" Principles into the Forestry of the Republic of Belarus up to 2030;
-Long-term Forestry Development Strategy of the Republic of Belarus with Low Level of Greenhouse Gases Emissions up to 2050.

All the above-mentioned documents were approved by the Scientific and Technical Council of the Ministry of Forestry as of 28.06.2019 No. 4.

Brief description of the main results:

In the current climatic changes forestry is seen as one of the most vulnerable sectors of economy.

Ministry of Forestry is responsible for implementation of the state policy in the field of forestry organization, including forestry adaptation to the climate changes. Legislation on use, protection, conservation and reproduction of forests is based on the Constitution of the Republic of Belarus, and includes Forest Code of the Republic of Belarus, Decrees of the President of the Republic of Belarus, and other legal documents regulating relations in the field of forest use, protection, conservation and reproduction. Organization of forestry on the principles of rational and inexhaustible forest use, including improvement of forest stability against current climate changes are reflected in the State Program "Belarusian Forest" for years 2016-2020 and in the "Strategic Development Plan of Forestry Sector from 2015 until 2030".

Within the frames of the assignment, analysis of the best international experience on development and implementation of actions on increase of greenhouse gases absorption by the absorbents (forest, swamps) of Germany, Turkey, Poland, France, Japan, Norway, USA, Spain, Sweden, Finland, Russia, and Canada was made.

Analysis of age structure of the forests and its influence at the absorption of carbon dioxide was done using methodological approaches that are based on the commonly used rules and mechanisms of productivity of forest stands, and on the "Methodology of Assessment of the Aggregated and Annual Carbon Depositing by the Forests of the Republic of Belarus" approved by the Ministry of Forestry. Materials of the state forest cadaster of the Republic of Belarus and actual data from the forest databank "Forest Fund" were used for the analysis. Study of the level of greenhouse gases absorption by forests and swamps demonstrates that annual depositing of the carbon for forest ecosystems is, as a rule, several times more than depositing of carbon by the swamps.

The key approach in the process of development of framework documents is the point that volume of carbon of annually harvested timber should not exceed volume of annual absorption of carbon by the stands of forest fund.

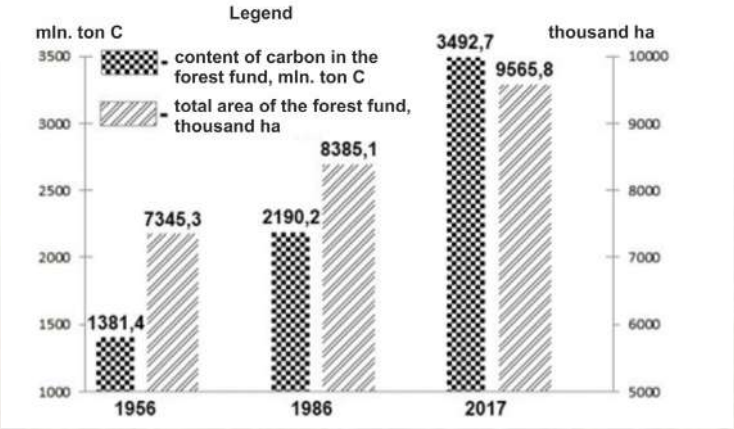

Figure 19. Dynamics of carbon and area of forest fund of the Republic of Belarus

Scenarios and prognoses of forestry development in climate change conditions were evaluated. Proposals on introduction and expansion of use of modern technologies of reforestation, afforestation, and forest fellings facilitating improvement of quality and sustainability of forests were prepared.

In the conditions of "green economy", forestry sector ensures maximum input into improvement of level of people's well-being through production of timber and non-timber products and services and creation of possibilities for income. At the same time, potential of forests as source of ecosystems services is being supported and developed on sustained basis with due regard to the climate change.

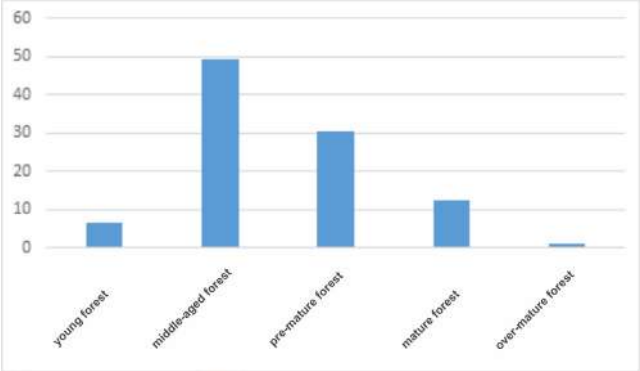

Figure 20. Carbon stock in pine stands by age groups, %

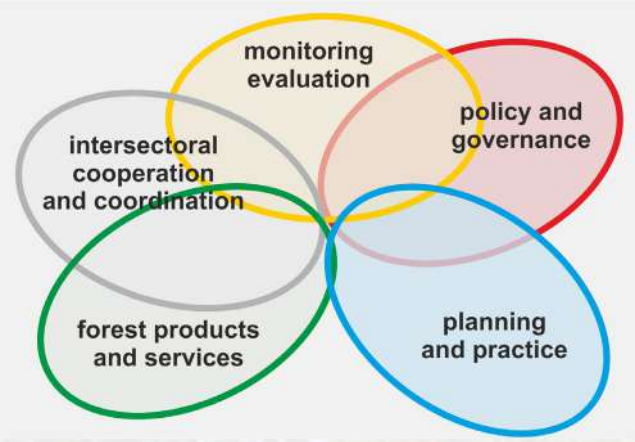

Figure 21. Complex attitude to sustainable forest management

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PROJECT ACTIVITY: Improvement and testing of a technology for the reconstruction of low-value plantations for the purpose of increasing the share of broadleaved species (3.1.5)

Implementation period: September 2018 - January 2020

Goal of the activity:

The goals of the assignment covered: analysis of the used previously practice of reconstruction of low-value forest stands (e.g. forests with low density, bushes, second growth stands, stands that are not properly developed in concrete conditions of growth) for the purpose of creation of valuable forest stands and increase of share of broadleaved forests; and development of proposals on improvement of the current normative and legislative basis on reconstruction of low-value stands.

Activity is implemented by: State Scientific Entity "Institute of Forest of the National Academy of Sciences of Belarus"

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe.

Key results achieved:

Methodical document on reconstruction of low-value forest stands to increase the share of broadleaved forests was developed. The document includes schemes of mixing of forest stands for creation of clear and partial forest cultures of broadleaved species in the process of reconstruction of low-value forest stands based on the zonal and typological basis. Practical recommendations on technologies and regime of intermediate cuts in the stands established in the process of reconstruction of low-value stands by corridor method were also prepared. The key aspect of the recommendations is to do intermediate cuts in the stands in several stages.

Brief description of the main results:

Currently, broadleaved stands (oak-, ash-tree-, maple-, lime-tree forests), cover 316,6 thousand hectares in the forest fund of the country, which makes 3,8% of the forest fund. In the last 13 years (2006-2018) reconstruction of the low-value forest stands through creation of forest cultures of broadleaved species was done on the area of 3,66 thousand hectares in the forest fund of the Ministry of Forestry. Searching for effective methods of restoration of broadleaved forests is becoming especially actual for the forest sector.

Within the frame of the assignment, experience of forest restoration and reconstruction of the low-value forest stands in France, Azerbaijan, Poland, Russia and Ukraine was studied.

Analysis of requirements of legal documents of Belarus in the field of reconstruction of low-value forest stands was made. The following issues were also explored: more precise definition of criteria of attribution of the stands to the category of low-value forest stands and their justification; decision on and order of implementation of intermediate cuts in the forest stands created in the process of reconstruction.

Analysis of forest management materials of state forest enterprises in relation to restoration of broadleaved forests created in the process of reconstruction of low-value forest stands, and using method of creation of forest cultures, was made.

A) B)

Photo 8. Mixed forest cultures of English oak at the pilot site:
A) Cultures of the oak in the corridor after intermediate cut; B) felled out sector

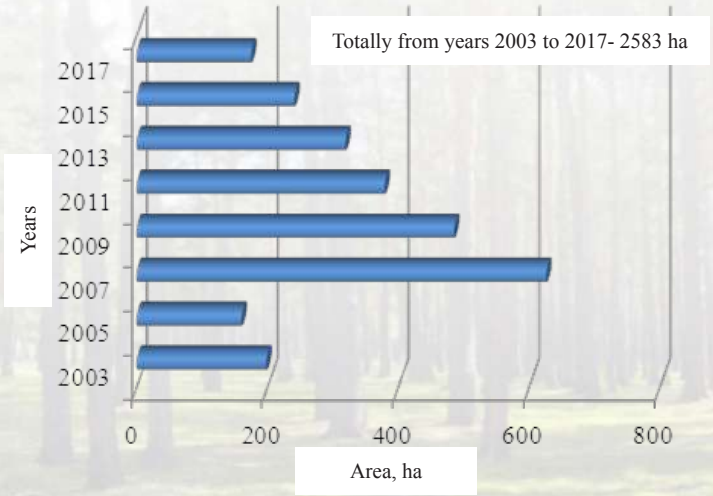

Figure 22. Creation of forest cultures of broadleaved species through reconstruction of low-value forest stands in the forest fund of the Ministry of Forestry (years 2003-2017)

Reconstruction of low-value forest stands through creation of forest cultures (clear of partial) is made by clumps and groups method, corridor method and via planning of cultures on the total area. Selection of the method of reconstruction of low value stands using method of creation of forest cultures depends mainly on the conditions, age, density and composition of the species to be reconstructed.

Technology of reconstruction fillings, formation of forest cultures, treatment and growing of the stands of the main broadleaved species (oak, ash-tree, maple) was piloted at 37 pilot sites on the territory of the forest enterprises of the Republic of Belarus and demonstrated its effectiveness.

6 trainings were held in each region of the Republic of Belarus (Brest, Vitebsk, Gomel, Grodno, Minsk, and Mogilev regions). Newly developed and improved technologies of reconstruction fellings and creation of forest cultures, treatment and growing of the stands of the main broadleaved species were demonstrated in the course of the trainings at the pilot sites. About 300 specialists of the forest enterprises took part in the trainings.

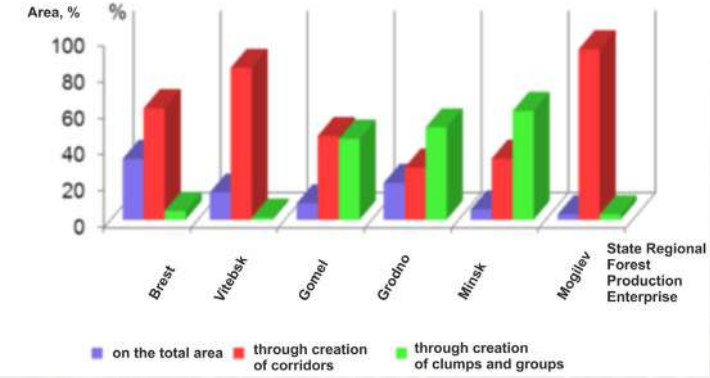

Figure 23. Methods of reconstruction of low-value stands through creation of forest cultures of broadleaved species

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https://bellesexport.by/ru/vidy-deyatelnosti/proekt-razvitiya-lesnogo-sektora-respubliki-belarus.html

PROJECT ACTIVITY: Improvement and testing of a technology for the reforestation of drying spruce felling sites for creating sustainable plantations (3.1.6)

Implementation period: October 2018 -January 2020

Goal of the activity:

The goal of the assignment was development of Methodical document on reforestation of the territories, on which fellings of the drying coniferous stands (spruce and pine forests) are done, through analysis of the practice of reforestation in other countries, current normative and legislative framework of the Republic of Belarus, methods of reforestation of the fellings of drying coniferous stands used currently by the forest enterprises of Belarus with due regard to different conditions of growth. Pilot sites should be laid out to test newly developed practices and methods of reforestation.

Activity is implemented by: State Scientific Entity "Institute of Forest of the National Academy of Sciences of Belarus"

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe

Key results achieved:

Methodical document "Recommendations on reforestation of felling sites of dried spruce and pine forest stands" was developed. Proposals for amendments to the current legislative framework with due regard to the results of piloting of reforestation technologies of felling sites of coniferous forests were also prepared.

Brief description of the main results:

During the last 20 years reduction of biological sustainability and drying of spruce stands are observed on the territory of Belarus. This trend has undulating nature.

In the years 2016-2018, new pathological phenomenon is registered in Belarus, which is large-scale drying of pine forests. One of the main reasons of drying of biologically weakened pine forests is mass dissemination of apical bark beetle *(Ips acuminatus*) and other forest pests that promptly react at declining of biological sustainability of forests.

Total area of dried coniferous forests in Belarus, which required clear sanitary cuts only in 2017, made 29,3 thousand hectares. Mass drying of coniferous stands on the large territories result in a number of unfavorable consequences, such as: damage to consistency and structure of forests; damage to regular silvicultural operations; violation of ecology of the regions; considerable losses of timber due to various biological injuries.

Effective protection of coniferous forests against the pests, and prompt localization and liquidation of pest infestation spots can be ensured in case of timely detection of the damaged stands. In its turn, detection of the damage forests is stipulated by the efficiency of forest pathological monitoring, the integral part of which is pheromone control. Currently, the most effective methods of management of forest pest spots are as follows: clear and selective sanitary

cuts; burning of felling wastes; cleaning the sites from the rubbish; prompt transportation of timber and its treatment with insecticides.

Practices and methods of reforestation of felling sites of drying coniferous stands (pine and spruce forests), and silvicultural, forest protective and prophylactic measures against drying of the forest stands were analyzed in Russia, Ukraine, Denmark, France, Poland, Latvia, Lithuania, Canada, and Germany.

Photo 9. Drying of pine stands in Gomelskij experimental forest enterprise caused by bark beetle

Analysis of drying of coniferous stands (spruce and pine forests) by sub-zones (regions) of Belarus in different conditions of growth taking into account peculiarities of water and physical characteristics of typical soils, and with assessment of weather conditions and hydrological regime in the last 5 years was done. The analysis was also done at the key points where measurements were made by hydro meteorological service of the country and other research institutes for the last decade.

Photo 10. 2- years mixed cultures of pine (6 pines 4 birches) created with planting material with closed root system (Gomelskij experimental forest enterprise, 2019)

Technologies of reforestation of felling sites of drying coniferous stands were tested through laying out of 25 pilot production sites on the territory of the forest enterprises of the Republic of Belarus and showed their effectiveness.

6 trainings were held in all the regions of the country (Brest, Vitebsk, Gomel, Grodno, Minsk, and Mogilev). Newly developed and improved technologies of reforestation of felling sites of dried pine and spruce stands in the forest fund of the Ministry of Forestry were demonstrated at the pilot sites in the course of the trainings. Around 300 specialists of the forest enterprises took part in the trainings.

Photo 11. 1-year mixed cultures of small-leaved linden (6 lindens 4 spruces) created at the felling site of the dried pine stands (Byhovskij forest enterprise, 2019)

Photo 12. Facilitation to natural regeneration of forest at the felling site of the dried pine stands (Luninetskij forest enterprise, 2019)

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PROJECT ACTIVITY: Monitoring research into changes in the forest fund in response to climate change, human impacts and forest activity and the development of recommendations for the preservation of plants of natural origin and biological diversity during reforestation, afforestation and forest use (3.1.7)

Implementation period: December 2016 - July 2019

Goal of the activity:
To establish the trends of modern dynamics of forest land and biological diversity of the forest ecosystem due to climate change. To suggest environmentally and economically effective measures to ensure current positive dynamics of wood stocks increment, and formation of stable natural forest with high level of biodiversity in the process of reforestation, forest growth and use taking into account ongoing increase of intensity of forest use and anthropogenic burden on the forest.

Activity is implemented by: State Scientific Entity «Institute of Experimental Botany named after V.F.Kuprevich of the National Academy of Sciences of Belarus»

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe

Key results achieved:

Forest management plans of Klichevskij, Glubokskij, Tolochinskij and Bogushevskij forest enterprises were amended upon results of field researches, and rare and key biotopes were identified.

Design of network of monitoring plots including 288 sites was developed. 214 sites out of 288 are established on the basis of forest monitoring plots. Dynamics of ecosystems due to climate change and intensive anthropogenic impact was assessed.

Software to collect and analyze monitoring data in forest ecosystems was developed. The software makes the process of data input automatic and ensures transformation of date into digital form.

Brief description of the main results:

Field researches on the territories of Klichevskij, Glubokskij, Tolochinskij and Bogushevskij forest enterprises were made. Sites of the forest fund to be specially protected in line with the new Forest Code were identified. The share of such sites is 0,9-2,8% of the forest fund of the forest enterprises. 256 passports and protective obligations for rare and typical biotopes, habitats of wild animals and location of wild plants included into the Red Book of the Republic of Belarus were prepared. Proposals on limitation of different types of fellings or prohibition of fellings on the territories of allocated biotopes and habitats and location of protected species of flora and fauna were developed.

Monitoring principles over consequences of climate change in forest ecosystems of Belarus were elaborated. Criteria and indicators to assess effectiveness of actions on forestry adaptation to the

climate change were prepared. Role and input of different factors into the dynamics and death of forest ecosystems were demonstrated.

Software for collection and analysis of monitoring data in forest ecosystems was developed. The software allows input, storage and processing of data of spatial, qualitative and quantitative characteristics of monitoring sites directly in forest ecosystems using tablets.

Changes of forest area of Belarus by forest formations, forest types, and origin were analyzed. Changes in spreading of the main forest species locating at the boundaries of natural habitats (common spruce, common hornbeam, gray alder) were assessed. Key factors of transformation of lands of the forest fund in post-war period (years 1944-2015) were identified.

After mass drainage of over- moistened lands in 60-80th. years of the last century , there are 289 thnd. hectares of drained forest lands in the forest fund of Belarus, and 1,5 mln.hectares of forests damaged by drainage networks. In the result of negative anthropogenic impact, degradation of forest lands and rewetting of forest stands are observed at the wet forest territories, and forest complexes are transformed into swamps. Recommendations for prevention of degradation of the lands of forest fund were developed and include: restoration of ground waters level; peculiarities of creation of forest cultures on the lands of open pits; actions on reduction of recreational burden on the forests.

System of actions for protection of natural origin and biological diversity in the process of reforestation, forest growth and use was developed. Advantage is given to the natural regeneration, increase of the share of non-clear commercial fellings, and preservation of some elements of biodiversity. Besides, some actions developed for protection of biological diversity were included into the normative documents regulating forestry management.

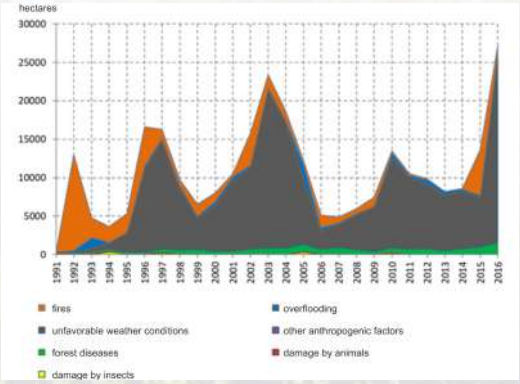

Figure 24. Dynamics of death of Belarusian forests in 1991-2016

Design of special monitoring over results of forestry activities on production of forests of high productivity and sustainability, and biological diversity in the process of development of forest management plans was elaborated. It was proposed to include new forms into the standard form of

explanatory note to the forest management plan, which include data on changes of area of specially protected nature territories; habitats of wild animals and location of wild plants included into the Red Book of the Republic of Belarus and transferred under protection of the forest enterprise.

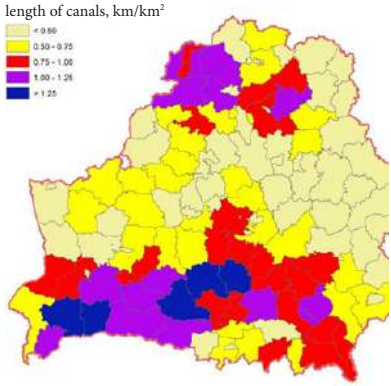

Figure 25. Length of canals of drainage network in the forest enterprises

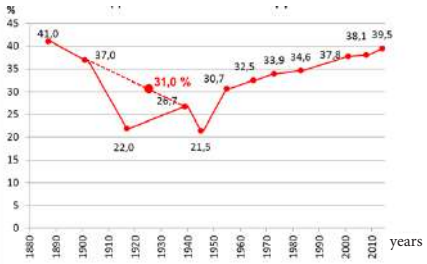

Figure 26. Dynamics of forest coverage of Belarus

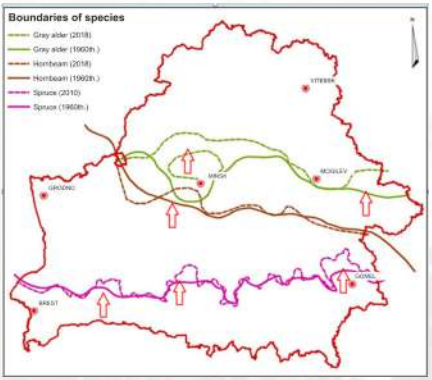

Figure 27. Changes of boundaries of spruce, hornbeam and gray alder forests on the territory of Belarus

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Link to the final report in English;

https://bellesexport.by/ru/vidy-deyatelnosti/proekt-razvitiya-lesnogo-sektora-respubliki-belarus.html

PROJECT ACTIVITY: Undertake monitoring and analysis of stands with and without project thinning and removal of felling waste interventions to assess Greenhouse Gas (GHG) emissions reductions (3.1.8)

Implementation period: September 2018 – January 2020

Goal of the activity:

Objective of the assignment was analysis of ecological, social and economic consequences of utilization of biomass of felling waste at the sites of intermediate fellings (thinnings and cut-through fellings). Analysis was carried out in order to identify necessity and scope of felling wastes to be removed after completion of thinnings and cut-through fellings to improve carbon sequestration capacity of the forests for the main tree species: pine, spruce, oak-tree, birch, black alder, aspen.

Activity is implemented by: Belarusian State Technological University

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe

Key results achieved:

International experience and practices of 14 countries in the field of treatment with felling wastes after intermediate cuts were studied and analyzed.

Analysis and monitoring over carbon sequestration capacity of pine, spruce, birch, aspen, black alder and oak forests were made under the following categories: forests, where intermediate cuts are not done; forests, here intermediate cuts (thinnings and cut-through fellings) are done, but without removal of felling wastes; forests, where intermediate cuts are done with further removal of felling wastes.

Methodology for assessment of carbon sequestration by felling wastes in the process of intermediate cuts by the main forest species was developed. Total storage of carbon by the whole phytomass of the stands is defined as sum of carbon storage by the concrete pool: timber of the trunk, branches and knots, needles (leaves), and roots.

Proposals with justification of social and ecological, and economic factors for removal/ non-removal of felling wastes in the process of thinnings and cut-through fellings were developed. The proposals were elaborated to ensure that absorption of carbon dioxide by the forest stands of Republic of Belarus in the forests of the main tree species is not reduced.

Brief description of the main results:

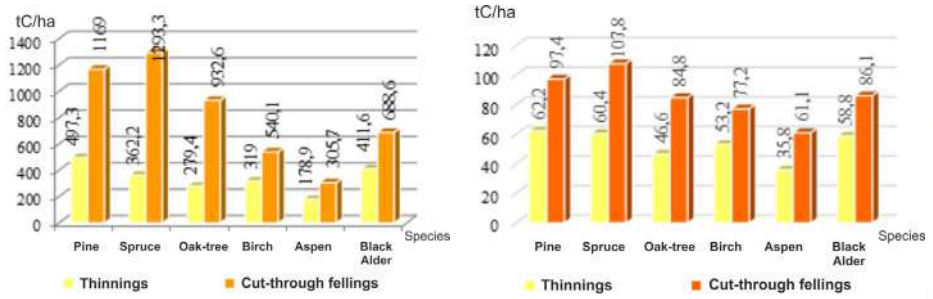
In the result of the study of international experience on treatment with felling wastes after intermediate cuts it was found out that in the majority of the countries chips and saw dust received from the felling wastes are used for production of the paper, cardboard, and cellulose and bark of the trees are burned at small thermoelectric power stations.

Increase of the share of usage of felling wastes for production of fuel and energy resources is justified mainly because of reduction of emission of greenhouse gases, which is ensured due to

substitution of the share of fossil fuel. Bioenergy of forests is considered as possible replacement to the fossil fuel.

Usually it is considered that biomass is CO_2-neutral energy carrier because carbon dioxide emitted in the process of burning of felling wastes is used again by the plants. Thus, burning of felling wastes is not considered as one of the sources of increase of emission of carbon dioxide into atmosphere.

Calculation and analysis of carbon sequestration capacity of the forest stands in the process of thinnings and cut-through fellings were done for 4 options: without fellings (basic option);



a) b)

Figure 28. Carbon sequestration by the forest stands of the main forest species at the age of thinnings and cut-through fellings: a) – for the whole age class corresponding to the age of thinnings and cut-through fellings, tC/ha; b) – in average for one year of the age of thinnings and cut-through fellings, tC/ha per annum.

with fellings and laying of felling wastes at the stripes with further compacting; with fellings and further chipping and spreading of felling wastes at the felling sites; with fellings and piling of felling wastes for further digestion; with fellings and further removal (burning) of fellings wastes.

Field and laboratory researches were done on the temporary trial plots to assess changes in the carbon stock in the felling wastes and to define speed of decomposition of felling wastes.

Optimal method of treatment with felling wastes will be ensured with such regime of organization of intermediate fellings and such volume of the left felling wastes, which result in: maximum accumulation of carbon by the forest ecosystem; due sanitary and forest pathological conditions of the forest stands; meeting of economic interests in relation to usage of marketable timber and felling wastes harvested in the process of intermediate cuts.

Usage of fellings wastes, as additional wood fuel or for ecological purposes, should be done with due regard to the analysis of such criteria as: soil productivity; content of nutrition elements in the felling wastes; demand of the stands in nutrition elements; type of forest growing conditions; area of felling site; distance from the transportation ways.

73 specialists took part in 2 roundtables, which were held to discuss results of the developed recommendations.

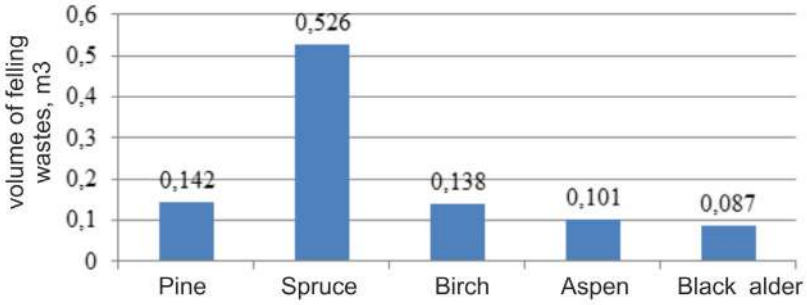


Figure 29. Volume of felling wastes (branches) per 1 m³ of timber in the process of cut-through fellings in the forest stands of the main tree species of Belarus

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PROJECT ACTIVITY: Development of the software for collection, processing, storage and provision of forest management information (3.2.1)

Implementation period: April 2020 - July 2021

Goal of the activity:
(I) development of the software (automated information system) for processing, storage and provision of forest management information "LesInfo";
(II) automation of the process of input and processing of forest management materials;
(III)integration of individual software products into a unified information complex through the unified information database on the forest resources of the Republic of Belarus.

Activity is implemented by: Private Enterprise "Softmax Systems Telemetrii"

Target audience: forest management specialists; staff of the Republican Unitary Enterprise "Belgosles"; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry.

Key results achieved:

Existing technologies of processing of forest management information, attributive data, cartographic information, normative and reference information used by the Republican Unitary Enterprise "Belgosles" were analyzed. Principles of creation of new software "LesInfo" were developed on the basis of the analysis.

Software "LesInfo" consists of the sub-systems of input, storage, and provision of forest management information, spatial analysis of data with possibility of demonstration of graphical pictures (public maps OSM, Google Maps and own maps), and creation of own information layers related to the forest fund.

Software "LesInfo" is new integrated technological platform, which uses modern systems of management of databases, IC accounting platform, mobile applications, cartographic services. Software "LesInfo" allowed:

substitution of the existing systems of automation of forest management information ("SOLI" and "FORMOD"), which worked on the old technological platform;

organization of electronic storage banks of data with multi-level access and automatic exchange of information with different external storage banks and various interfaces of users access;

organization of mobile working places of forest inventory specialists for implementation of field works;

automation of processes of input and processing of forest management data with usage of stationary computers and smart phones;

automation of spatial analysis of data and expansion of information cartographical services in the process of analyzing and visualization of the data;

automation of organization of group work with data, processes of planning and control over the works, accounting of resources and changes management.

Introduction of the software "LesInfo" ensures: (i) improvement of effectiveness of works and reduction of labor costs to carry out the works due to new principles of input of data by the forest inventory specialists because of combination of two devices for organization of the

work of specialists (Notebook and Smartphone); (ii) reduction of burden on the managers due to automation of the procedures of planning, distribution, operative monitoring and control; (iii) improvement of quality of information in the storage databanks, including reliability, accessibility and authenticity due to the proper organization of electronic storage databanks, automation of procedures of control of integrity of data.

Brief description of the main results:

Information systems for processing of forest management data (called "SOLI") used in Belarus and system of management of databank were developed more than 20 years ago for operation system MS DOS. The system consists of a lot of different applications and programs, does not have one common storage of data and does not support integration of these software products into one complex.

New software "LesInfo" allows processing of information in the process of development of forest management plans, supporting in actual conditions common information databanks on forest resources of Belarus, integration of information resources and technological processes of forest management, and makes processes of development of forest management plans automatic.

Album of output forms containing requirements to 150 standard forms of tables and reference reports, which are used for processing of forest management information, was developed. The data can be exported and stored in the formats MS Word, MS Excel and pdf.

There is also possibility to integrate reports by different levels of management (forestry unit, forest enterprise, administrative districts, regional production state forest enterprise, region, republic), and also at more minor levels (sub-compartments).

Mobile application "LesInfo" was developed. The application allows: distribution of works between the staff for long-term perspective, with visualization of the defined tasks in the calendar and directly on the map (by routes and territories); control over work of the staff in the field including demonstration of the actual route on the map in the process of tasks implementation; control over accumulative statistics of results and effectiveness of work by concrete person, calendar schedule of works, and calendar schedule of staff availability (vocational schedule, working shifts, etc.).

Effective collaboration means were developed in the process of implementation of this assignment, including organization of remote regime of work to prevent Covid-19 spreading.

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PROJECT ACTIVITY: Development of the software "Reforestation Management Information System" (3.2.1.1.)

Implementation period: August 2017- April 2020

Goal of the activity:

To develop a new multi-level information system to support decision-making in the process of planning of afforestation and reforestation: «Reforestation Management Information System" (hereinafter referred to as software «Reforestation") for the following forest management levels: forestry, forest enterprise, regional production forest enterprise, Ministry of Forestry of the Republic of Belarus.

Activity is implemented by: Republican Unitary Enterprise «Belgosles»

Target audience: workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; staff of research institutions and educational organizations.

Key Achieved Results:

New software (information management system) "Reforestation" was developed to ensure improvement of effectiveness of reforestation and afforestation, automation of planning process, and exclusion of errors in the process of integration of reporting documentation.

The software "Reforestation" has capacities allowing creation documents in electronic format in strict conformity with technological process of reforestation and afforestation, starting from the planning of reforestation on the concrete site and until transfer of the site into the category of forested lands.

The newly developed software ensures automatic generation of the summary and reporting documents based on the created initial documentation for artificial and natural reforestation. Summary and reporting documents are generated into the Excel and Word files, with the possibility of their further printing on the paper. The following information is available for entities working in the field of forestry management: information by sub-compartments and total information by years on the areas of reforestation, including by different species; information by types of forest culture; and information on the silvicultural works undertaken with the dynamics of survival rate of the forest cultures.

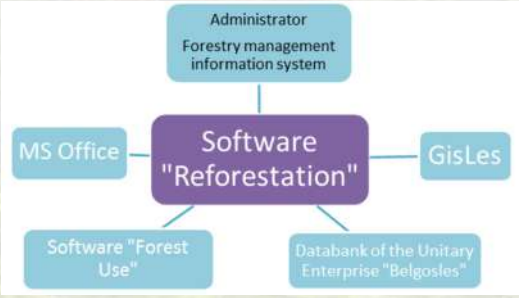

Figure 30. Interconnection of the software "Reforestation" with forestry information systems.

Software "Reforestation" interacts with the other forestry management information systems (software "Forest Use", 1C:Forestry) and thus increases the volume of the stored information.

The new software was installed in all 98 forest enterprises of the forestry sector. In 2020 one common database of the sites of forest fund, on which reforestation has been made since 2010, was established.

Brief description of the main results:

Software "Reforestation" allowed to: ensure rational planning of reforestation and afforestation; to fix in electronic format sites (felling sites, lands damaged by the fire, and other sites non covered by the forests in the forest fund) for obligatory reforestation in a period not exceeding 2-3 years after appearance of such sites; to control over all the silvicultural operations, including assessment of survival rate at the sites, where the trees were planted.

Due to the software "Reforestation", the following can be generated in electronic format and printed: registration books of the areas of reforestation and afforestation; certificates of inspection of a site of forest fund; field inventory cards and other reporting documents related to the forest cultures, including on facilitation to natural regeneration and on natural regeneration. User guide was developed. Usage of the software "Reforestation" was piloted in industrial conditions at the basis of three forest enterprises (Lepelskij forest enterprise, Shchuchinskij forest enterprise, and Osipovichskij experimental forest enterprise).

6 training workshops to work with newly developed software "Reforestation" were organized in Brest, Vitebsk, Gomel, Grodno, Mogilev and Minsk regions. 170 specialists took part in the trainings, including staff responsible for reforestation and afforestation from the forestry enterprises and regional production forest enterprises.

Photo 14. Training workshop in the State Enterprise "Shchuchinskij forest enterprise", 04 February 2020.

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PROJECT ACTIVITY: Development of the thematic area in the field of training, retraining and professional development of staff in the forest sector (3.3.1)

Implementation period: July 2020 - July 2021

Goal of the activity:

The overall goal of the assignment was improvement of the system of training, re-training and improvement of skills of the workers and specialists of forest sector through development of 11 new training and thematic plans, training programs and courses of lectures for each new topic based on the most recent findings in the field of forestry.

Activity is implemented by: individual consultant Yushkevich N.T.

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe

Key results achieved:

Currently, many efforts are put by the Ministry of Forestry of the Republic of Belarus to support opening of new professions and other training programs, and correction of training documentation of the educational process to ensure training of high qualified manpower for the forestry sector. Improvement of skills of the managers and specialists of organizations of forest sector is organized at the Republican Training Centre for Improvement of Skills of Forestry Manpower.

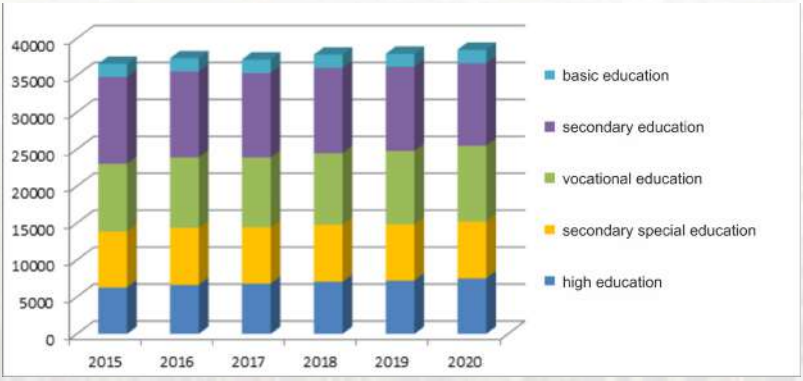

Figure 31. Education levels of the specialists of forest enterprises

Analysis of training and program documentation of the professions of high, specialized secondary, professional, and technical education shows that education of manpower for the organizations of forest sector is practically oriented. Most part of auditory lessons comprise practical, laboratory and seminar activities, and trainings and production practices. This leads to development of professional competencies and practical capacities in the respective fields of activities of the future specialists. Practical and laboratory classes are organized with the use of modern material and technical basis of the educational institutions. Technical equipping of the

institutions is upgraded on permanent basis with training stands, devices, models, new samples of modern equipment produced locally and abroad and used in the forest enterprises and other organizations of forest sector. Material and technical basis of the leading organizations of forest sector and resource centres are also used for practical trainings.

To ensure training of high-qualified specialists for the organizations of the forest sector, and improvement of educational process, 11 new educational programs and lectures were elaborated taking into account fast development and introduction of new technologies in the forest complex.

Since 2021, these programs are included into educational process at the Republican Training Centre for Improvement of Skills of Forestry Manpower.

Brief description of the main results:

Manpower potential of the organizations of forest sector of the Republic of Belarus was analyzed for the period 2015-2020 by the following criteria: age, professional education, periodicity of improvement of skills, labor turnover, and types of professional activity

The analysis revealed that organizations of forest sector has all required high qualified managers, specialists and workers in all the fields of the economic activities. The staff have necessary education pursuant to the requirements of the current labor legislation

Study of educational institutions of the Republic of Belarus and educational systems used abroad in the field of training, re-training and improvement of skills of specialists of the entities of

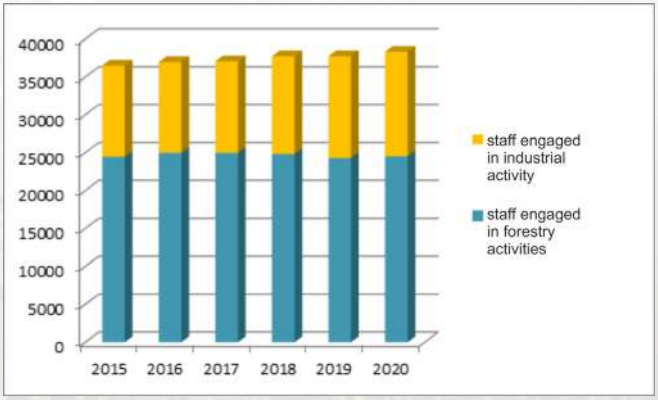

Figure 32. Staffing of the forest enterprises by directions of activities

forest sector was carried out.

To actualize training plans for improvement of skills of the specialists of forest sector new training programs and lectures were developed under the following directions:

Intensive methods of production of forest planting material.

Innovations in current forest management and planning.
Silvicultural operations in the conditions of nature and anthropogenic anomalies.
Innovations in timber harvesting production.
Improvement of effectiveness of forest nurseries and production of high-quality forests.
Forest adaptation to the climate change, including risk assessment in long-term perspective.
Stretching of chain of custody and certification.
Forest fire prevention in Belarus: new instruments and methods of communication with population.
Improvement of effectiveness of concrete managerial and field processes through application of technologies and IT solutions.
Promotion of sustainable tourism
Improvement of managerial potential, including development of strategy, leadership, and manpower management.

New training programs are targeted at the study of innovative findings developed also within the current Project in the field of effective introduction of the most recent technologies and equipment in the organizations of the forest sector.

New programs and findings cover the following topics: biodiversity issues in the process of forestry management; forest adaptation to the climate changes; carbon sequestrating role of the forest; silvicultural activities in the drying spruce and pine forest stands; reconstruction of low-value forest stands; green economy. Inclusion of the mentioned new directions and trends is required with due regard to the European and world approaches and practices, and to take in account all the ecosystem services provided by the forests to full extent.

Link to the final report in Russian:
https://mlh.by/our-additional-activities/mezhdunarodnoe-sotrudnichestvo/sotrudnichestvo-so-vsemirnym-bankom/

Link to the final report in English:
https://bellesexport.by/ru/vidy-deyatelnosti/proekt-razvitiya-lesnogo-sektora-respubliki-belarus.html

PROJECT ACTIVITY: Development of a system of support for decision-making concerning forest management in radioactive contamination areas, real time informing about the radioactive conditions in the territory of the forest fund (3.4)

Implementation period: May 2016 - March 2018

Goal of the activity:

The objective of the assignment was to optimize forest use on the territory of radioactively contaminated areas of the forest fund through: improvement of prompt informing on radioactive condition in the forest; use of the updated information on the levels of radionuclide content in the components of forest biogeocenosis and forest products; and development of forecasting of change in radiation conditions.

Activity implemented by: State Enterprise "Bellesozashchita"

Target audience: staff of research institutions; specialists of forest enterprises and forestry units of the Ministry of Forestry working with radionuclide contamination of the forest stands; partners from other countries of Eastern Europe

Key results achieved:

Decisions on organization of concrete activities in the forest are taken with due regard to the information on radioactive conditions. Results of radiation exploration of the lands of forest fund, felling sites, and forest products are contained in the databank of the information system "Radioactive forests contamination. RadFor" (hereinafter "software "RadFor") and its version for the forest enterprises "RadForView". While organization of forestry operations in the conditions of radioactive contamination, prompt exchange and transfer of information on the indicators of radioactive conditions should be ensured, including density of soil contamination with cesium-137; capacity of dose of gamma radiation; content of cesium-137 in the timber.

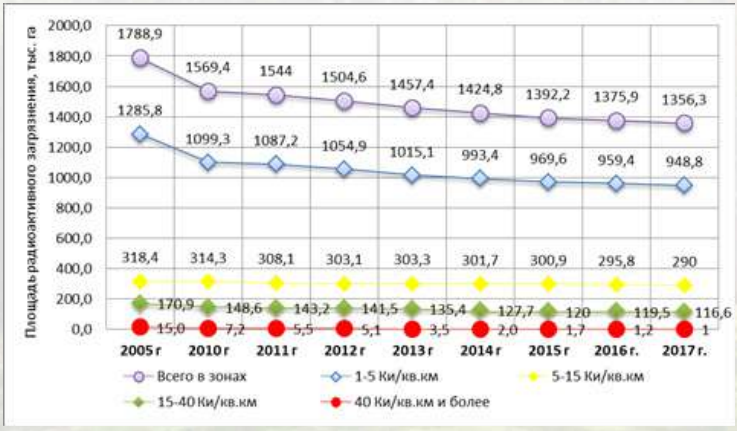

Рисунок 33. Изменение площади радиоактивного загрязнения лесного фонда Минлесхоза

This information is used in the process of forest felling operations to ensure that harvested timber meets the requirements of hygienic standards, and content of cesium-137 does not exceed allowable levels.

Requirements to the forestry management in the radioactive contaminated zones were revised. Amendments were developed and introduced into the normative documents related to the technology of forestry management in the radioactive contamination zones.

Works on optimizing of the software "RadFor" and "RadForView" in relation to the collection and transfer of information on indicators of radiation conditions of the forests were accomplished.

Additional functions of the software "RadFor" on submission of summary information on radioactive contamination of the territory of the forest enterprises with prognoses of changes in radiation conditions at the concrete defined date were developed.

Information on changes in radiation conditions during the 10-years period of implementation of forest management plans is necessary, first of all, for the most "contaminated" forest enterprises, which have timber with increased republican allowable level of content of radioactive elements. In Gomel region, these are Vetkovskij, Narovlyanskij, and Checherskij special forest enterprises, Elskij, Gomelskij, and Hoinikskij forest enterprises; and in Mogilev region, these are Krasnopolskij, Kostyukovichskij, and Cherikovskij forest enterprises.

Brief description of the main results:

In the result of the accident at Chernobyl nuclear power station in April 1986, one quarter of forests of the Republic of Belarus was contaminated by radionuclides. Currently, the area of forests contaminates with cesium-137 is 1356,3 thousand hectares or 16,1%.

Protective measures must be undertaken due to the considerable area and levels of radioactive contamination of the forests. These actions are targeted at meeting the norms of radiation safety: doses of radiation of the staff should not exceed 1 mSievert/annum; content of cesium-137 should not exceed republican allowable levels. To ensure these conditions are followed, the works are done within the allocated radioactive contaminated zones and with obligatory radiation control.

Amendments to the normative documents that have been developed will allow to have more precise indicators of radiation conditions in the forests in the cases if there are problems with harvesting of normatively "clean" forest products, and to reduce scope of radiation control if there are no such problems.

Technical code of common practice 240-2010 "Exploration of lands of forest fund" was amended in relation to definition of uniformity of radioactive contamination of forests in I zone (1-5 Ci/km^2), and requirements to the selection of forest sites for exploration for more detailed examination of radiation conditions. It was found that share of the forest sites, which have been transferred to the zone with less density of contamination, increased in comparison with previous years. The area of radioactive contamination is decreased in average by 2,0% annually in the result of radiation exploration of the lands of forest fund.

Amendments of the Technical code of common practice 239-2010 "Exploration of forest felling sites" cover the following: study of one specially selected forest felling site with the density of contamination of 2-5 Ci/km^2 in the forestry unit, on the territory of which content of cesium-137 in the timber does not exceed 200 Bq/kg; usage of the results of the study of this forest felling site for confirmation of radiation safety of all the batches of timber from other felling sites of the same forestry unit. The amendments can be applied in 32 out of 41 forest enterprises with the territories with contamination density of 2-5 Ci/km^2.

Amendments to the Rules for organization of forestry in radioactive contaminated zones (hereinafter "The Rules") were developed with due regard to the positive changes in the forest fund, and namely: area of radioactive contamination decreased from 2009 till 2016 by 12,4%; content of cesium-137 in the forest products reduced. Amendments to the mentioned Rules touch upon the following: zoning of territories; regulation of forestry operations and forest use; requirements to radiation exploration of forest harvesting volume; requirements to the submission of data evidencing radiation safety of the forest products to be sold; requirements to the informing.

Practical usage of the newly developed Rules for control of radioactive contamination ensures receiving of actual information on radiation conditions on the territory of the forest fund, and guarantees delivery of normatively "clean" forest products to the customer, which means products with content of radionuclide not exceeding republican allowable levels.

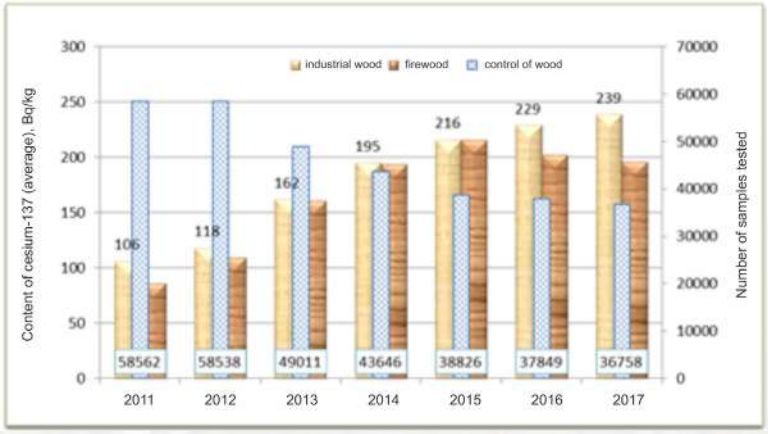

Figure 33. Change of the area of radioactive contamination of the forest fund of the Ministry of Forestry

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PROJECT ACTIVITY: Improvement of information flow about the radioactive conditions in the forests (3.4.1)

Implementation period: February 2020 - February 2021

Goal of the activity:

Objective of the assignment was to develop an information module on radioactive contamination of the forest fund. Development of such a module will simplify and facilitate the process of obtaining the information about the radiation situation in forests using cartographic materials. The module will allow visualization of the received information on the map in real-time mode and forecasting change of radiation situation in time. This will raise the awareness of the forestry enterprises' senior staff and support decision-making when planning and managing forest use at radioactively contaminated areas of the forest fund.

Activity is implemented by: State Enterprise "Bellesozashchita"

Target audience: staff of research institutions; specialists of forest enterprises and forestry units of the Ministry of Forestry working with radionuclide contamination of the forest stands; partners from other countries of Eastern Europe

Key results achieved:

Currently there is a possibility of step-by-step return to the normal conditions of forestry management due to the reduction of radioactive contamination levels and intensity of transition of ^{137}Cs into vegetation, and as consequence, reduction of ^{137}Cs content in the forest products. Majority of radionuclides, which have fallen out of the soil surfaces and have been included into reaction with the soil absorption complex, are in fixed form. This reduces availability of radionuclides in the nutrition chain "soil- vegetation", and does not allow ^{137}Cs to get more deeper into the soil.

Geoinformation service "RadForInfo" (software) was developed, which is directly connected with the indicators of radiation conditions of the forests within the existing information system (software) "RadFor". Usage of "RadForInfo" facilitates prompt decision-making on forest use (forest fellings) in radioactive contaminated zones, and first of all, with high density of soil contamination with ^{137}Cs (hereinafter- contamination density) from 15 until 40 Ci/ km^2 (III zone).

Geoinformation software "RadForInfo" consists of two functional parts:

Information part, which reflects data from the database "Radiation conditions", database "Forest products" and estimated values;

Cartographic part, which ensures: management of images; correction of layers of the map; graphic-based mapping of current and prognosis information on density of soil contamination with ^{137}Cs of the forest compartments of concrete forestry unit and information on ^{137}Cs content in the timber in the forest compartments of concrete forestry unit.

Function of "time scroll box" was developed. This function allows to generate map of forestry unit (forest enterprise) with coloring by radioactive contaminated zones with prognosis for the concrete year, and to generate maps "^{137}Cs content in timber" with prognosis of changes of ^{137}Cs content in the timber.

Consolidated interactive map of each forest enterprise with bridging to forest compartments and sub-compartments was created. Detailed information on radiation conditions can be seen while choosing objects at the map.

Brief description of the main results:

As of 01.01.2020, territories of 44 forest enterprises of the Ministry of Forestry are contaminated with radionuclide cesium-137 at the area of 1262,4 thnd. hectares or 14,77% of total area of the forest fund. In time, as radioactive contamination levels are reduced, it is possible to return step-by-step to the normal conditions of forestry management at the territories with high density of contamination- more than 15 Ci/km^2. To ensure this, preliminary assessment of radiation conditions is required and should be based on the previously obtained data.

The key criterion for decision-making is such indicator as "contamination density" in the forest compartment. This indicator is actualized on permanent basis and characterizes radiation

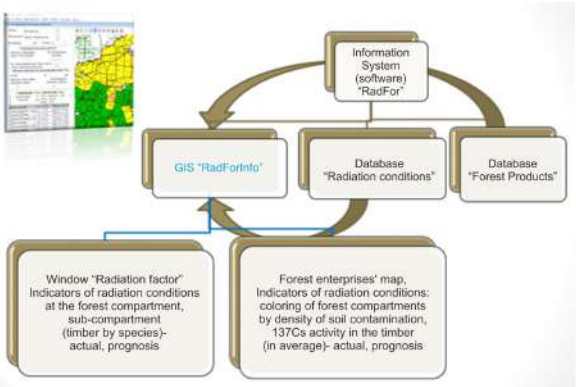

Figure 35. Geoinformation service "RadForInfo"

conditions: minimum, average and maximum surface contamination of soils by ^{137}Cs. In the process of exploration of forest compartment, samples of soil are taken with forest litter and plants from the surface soil layer for the depth up to 20 cm. Contamination density is concretized on the basis of prognosis of possible transfer of forest compartment from the zone with large contamination density to the zone with less contamination density. In the last three years, the prognoses are confirmed by 70-80%. Dose rate and ^{137}Cs content in the forest products are in direct proportion to this indicator.

Software "RadForInfo" was tested in production conditions in the forest enterprises. Pilot testing revealed that the software ensures interaction with information systems of the forest enterprises, and generating of full, reliable and actual information on radiation conditions in the forests with usage of cartographic materials.

To facilitate effective usage of the software "RadForInfo" in the forest enterprises training workshops were held for 40 specialists from the departments of radiation control of forest enterprises of Gomel and Mogilev regions. Installation disks with uploaded maps and cartographic service of "RadForInfo" of each forest enterprise were prepared. Presentation and visual training materials were developed and given to the forest enterprises.

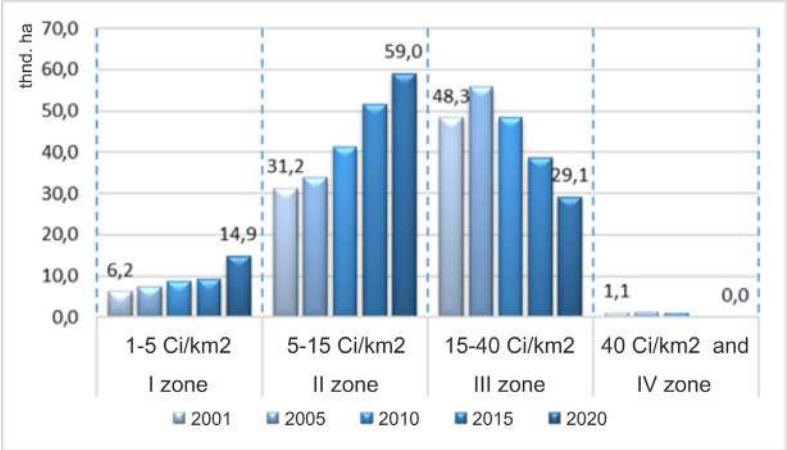

Figure 36. Change of the area of contamination zones of Vetkovskij special forest enterprises from 2001 until 2020

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PROJECT ACTIVITY: Development of methods and techniques for the preservation of biological and landscape diversity during the conduct of forest management activities and forest use (3.1.1.3)

Implementation period: April 2020 - July 2021

Goal of the activity:

Overall objective of the assignment was improvement of legislation and policy in the field of forestry to ensure conservation of biological and landscape diversity. In the result of this activity, the following tasks were performed: (i) electronic register of all the specially protected nature territories on the territory of the forest fund of the enterprises in the structure of the Ministry of Forestry was prepared; (ii) proposals on amendments to the normative and legislative documents regulating forestry activities and standards in the field of forestry were prepared in line with new legislation on specially protected nature territories and new normative and other framework documents in the forest sector.

Activity is implemented by: Belarusian State Technological University

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Schools studying forestry; civic society; partners from other countries of Eastern Europe

Key results achieved:

Sustainable forest management and forest use is impossible without conservation of biological diversity of forest ecosystems. In 2020, "Decade of biodiversity" of the United Nations Organization was completed as well as Strategic Plan for Biodiversity (2011-2020). Results on achievement of 5 strategic goals and 20 Aichi Biodiversity Targets were summarized.

In the result, it was confirmed that conservation of most part of biodiversity in the world is absolutely dependent on how the forests are used, because majority of the world biodiversity of the land is concentrated precisely in the forests.

Within the frames of the assignment, electronic register of all the specially protected nature territories (nature reserves, nature monuments) allocated in all 98 forest enterprises of the Ministry of Forestry of the Republic of Belarus was compiled. The register is integrated into geoinformation system on the basis of the existing geoportal of the Unitary Enterprise "Belgosles", which can be found following https://park.belgosles.by/map.html. From the technical point of view the register is databank containing descriptive attributive characteristics of the specially protected nature territories and cartographic images of the sites.

Exploration of the forest fund of Vetkovskij special forest enterprise and Narovlyanskij special forest enterprise were undertaken to identify rare and typical biotopes and nature landscapes; habitats of wild animals and location of species of wild plants included into the Red Book of the Republic of Belarus. Documents required for transfer of the protected animals and plants under protection (167 passports and protective obligations) pursuant to the legislation were prepared and handed over to the territorial bodies of the Ministry of Natural Resources and Environmental Protection.

International approaches and initiatives to secure conservation of biological diversity were analyzed, including Bonn Challenge and commitments made at the first Ministerial Roundtable on Forest Landscape Restoration and the Bonn Challenge in the Caucasus and Central Asia in Astana, Kazakhstan, etc. (20 international agreements and conventions related to Belarusian forestry, which were ratified by the Republic of Belarus). In general, requirements of international agreements and initiatives (directly related to the forestry, forest use or applicable for forestry) are reflected in Belarusian normative and legislative documents.

The following draft amendments to the state standards of the Republic of Belarus were developed to ensure harmonization with requirements in the field of biodiversity and provisions of the international agreements and conventions.

Draft state standard STB 1708 "Sustainable forest management and forest use. Basic requirements (new version)".

Draft state standard STB "Group certification of forest management and forest use. Requirements";

Draft state standard STB 2157-2016 "Identification of wood and non-wood forest products upon origin. Basic requirements".

Brief description of the main results:

Restoration of natural stands should be made mainly through natural regeneration, and only if application of this method is impossible restoration is made with usage of forest cultures. Even in case of clean sanitary cuts it is necessary to ensure possibility of natural or combined restoration. It is vital to consider possibility of establishment of forest genetics reservations as sites of permanent seed management base.

Particularly taking into account necessity of conservation of gene fund, natural and especially high productive stands on the territory of the specially protected nature territories are of high interest. Because of this, amendments are proposed to the article 24 "Regime of protection and use of specially protected nature territories" of the Law on specially protected nature territories and should include possibility of lay out of forest genetics reservations in any types of the specially protected nature territories. This type of sites of permanent forest seed base is used in very limited manner, and first of all, as source of seed or vegetative material for establishment of forest seed plantations and especially population plantations inheriting completely features of the mothers' local populations including sustainability and productivity.

Draft amendments to the technical and normative legislative documents were prepared upon analysis of the national legislation.

Matrix of contradictions in the national legislation in relation to the forest use, and contradictions because of the common practice of forest use was prepared. The largest number of contradictions are revealed in the state standard STB 1359-2002 "Sustainable forest management and forest use. Requirements to the forest protective actions" approved and put into action by the Resolution of the State Standard of the Republic of Belarus as of 09.12.2002 No.54. This is caused by the fact that the standard was not revised during the last 10 years from one side, and from the other side significant changes were introduced to the legislation of the Republic of Belarus in this period.

2 round tables on new approaches to the conservation of landscape and biological diversity on the territory of the forest fund of the Ministry of Forestry of the Republic of Belarus were held with 132 participants. Draft normative and technical documents were also discussed at the round tables.

Due to the epidemiological situation caused by COVID-19 in the Republic of Belarus and based on the recommendations on limitation of organization of public events, corrections have been made to the initial plan of the activities. Amount of face-to-face participants of the round tables was limited to ensure social distancing. Because of this, distant online participation of the people was ensured via platform "Peregovorka" (https://peregovorka.by/).

Photo 15. Lichen pine forests

Photo 16. Black alder and white birch forests at the excessively wet soils and fen mires

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PROJECT ACTIVITY: Training of professionals engaged in forest sector, forest science, forest education and Ministry of Natural Resources and Environmental Protection on issues related to sustainable forest management and forest use aimed to promote forest ecosystems resilience and conservation under climate change

Implementation period: October 2020, April 2021

Goal of the activity:

General goal of the activity was to organize and hold training "Modern ecologically oriented technologies for application of plant-protecting means and fertilizers in forest nurseries", including practical classes on the basis of the Republican forest selection and seed center; and publication of educational and information materials.

Activity is implemented by: Belarusian State Technological University

Target audience: staff of research institutions and educational organizations; workers of forest enterprises and forestry units of the Ministry of Forestry; students of High Sch

Photo 17. Practical studies at the Republican forest selection and seed center

Photo 18. Practical studies at Negorelskij educational and experimental forest enterprise

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