

Appendix 7

Working Paper: Forest Sector – Serbia Assessments and Recommendations

For the GCF-FAO Project “Enhancing the resilience of Serbian forests to ensure energy security of the most vulnerable while contributing to their livelihoods and carbon sequestration (FOREST Invest)”

Table of Contents

| | |
|---------------------------------|---|
| Abbreviations and Acronyms..... | 4 |
| Currency Equivalent | 4 |

| | |
|--------------------------------------------------------------------------------------------------|----|
| Weights and Measurements | 4 |
| Definitions and Glossary | 5 |
| 1) Executive Summary | 6 |
| 2) Introduction | 7 |
| 3) Country Context | 8 |
| 4) Project Area Context (related to the topic of the Working Paper) | 17 |
| 5) Sector Performances | 20 |
| 6) State Support to the Sector | 25 |
| 7) Past and Ongoing Development Projects / Programmes (table) | 26 |
| 8) Lessons Learned and Good Practices | 37 |
| 9) SWOT Analysis of the Sector | 38 |
| 10) Proposed interventions and Recommendations | 39 |
| 10.1 Rationale and Detailed Description of Proposed Interventions | 39 |
| Contribution to Project Results | 45 |
| Group of Activities..... | 53 |
| Cost estimate | 78 |
| Timeframe | 80 |
| 10.2 Institutional Aspects/partners and Implementation Arrangements | 81 |
| 10.3 Expected Benefits | 83 |
| 10.4 Monitoring and Evaluation (please provide smart indicators and means of verification) | 84 |
| 10.5 Risks and Mitigation related to the sector and proposed interventions | 89 |
| 10.6 Sustainability (environmental, economic and social)..... | 91 |
| 11) Conclusions | 91 |
| 12) References | 92 |
| 13) Annexes | 93 |

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Table 1 Forest cover change trends in the Republic of Serbia (2015) [4] | 9 |
| Table 2 Key figures for forest lands (state/private) in Central Serbia (Source: official websites of PEs) [14] | 18 |
| Table 3 Key figures for forest land in AP Vojvodina (Source: internal data of PE "Vojvodinašume") | 20 |
| Table 4 Key figures for state-owned forests managed by PE Serbia Shume [17] | 21 |
| Table 5 Key figures for state-owned forests managed by PE "Vojvodina Shume" [18] | 22 |
| Table 6 Total volume of wood production grouped by assortments [19] | 23 |
| Table 7 Active companies and entrepreneurs engaged in forestry operations, wood processing, furniture manufacturing and paper industries in 2019 (Source: internal data of the Chamber of Commerce and Industry of Serbia, 2020) | 24 |
| Table 8 Afforestation and Restoration investments supported by the BFF in Central Serbia during the period 2015-2019 (Source: internal data of the Directorate of Forests, 2020) | 25 |
| Table 9 Afforestation and other forestry investments supported by the BFF of AP Vojvodina during the period 2016-2022 (Source: internal data of the Directorate of Forests, 2022) | 26 |
| Table 10 SWOT Analysis of the Forest Sector in Serbia | 39 |
| Table 11 Forest restoration through planting interventions for climate change adaptation and mitigation benefits | 42 |
| Table 12 List of Proposed Species for FLR in Central Serbia | 48 |
| Table 13 List of potential Species for FLR in Vojvodina (only native species will be used in the project) | 50 |
| Table 14 List of Potential Species for FLR on salinated soils in Vojvodina (only native species will be used in the project) | 53 |
| Table 15 Main Activities and Deliverables of project component 1 | 53 |
| Table 16 Main Activities and Deliverables of project component 2 | 59 |
| Table 17 Adaptive forest management measures providing climate change adaptation and mitigation benefits | 67 |
| Table 18 Main Activities and Deliverables of project component 3 | 71 |
| Table 19 Estimate of cost for forestry-related project activities | 79 |
| Table 20 Role of the main institutional stakeholders | 82 |
| Table 21 GCF performance monitoring framework | 86 |
| Table 22 Contribution to Sustainable Development Goals | 88 |

| | |
|----------------------------------------------------------------------------------------------------------------|----|
| Figure 1 Directorate of Forests - institutional set-up (Source: unpublished organigram of the DoF, 2023) | 14 |
| Figure 2 Correlation between temperature and area affected by pest | 40 |
| Figure 3 Project's implementation arrangements | 81 |

Abbreviations and Acronyms

| | |
|--------|-----------------------------------------------------------|
| AP | Autonomous Province |
| BAU | Business as usual |
| BFF | Budget Fund for Forests |
| CAS | Climate Adaptive Silviculture |
| CE | Collect Earth |
| DoF | Directorate of Forests (of MAFWM) |
| FDP | Draft Forestry Development Programme |
| FDS | Forestry Development Strategy of Serbia |
| FIS | Forest Information System |
| FLR | Forest Landscape Restoration (FLR) |
| FMP | Forest Management Plan |
| FoF | Faculty of Forestry, Belgrade |
| FRA | Global Forest Resources Assessment |
| GVA | Gross Value Added |
| IFI | International Financial Institution |
| IoF | the Institute of Forestry, Belgrade |
| ILFE | Institute of Lowland Forestry and Environment, Novi Sad |
| LoAL | Law on Agricultural Land |
| LoF | Law on Forests |
| LULUCF | Land Use, Land-Use Change and Forestry |
| MAFWM | Ministry of Agriculture, Forests and Water Management |
| MESTD | Ministry of Education, Science and Technology Development |
| NFI | National Forest Inventory |
| NFMA | National forest monitoring and assessment |
| NGO | Non-governmental Organization |
| NWFP | Non-wood forest product |
| PE | Public Enterprise |
| PES | PE Serbia Shume |
| PEV | PE Vojvodina Shume |
| PFOs | Private Forest Owners |
| PFOAs | Private Forest Owners associations |
| PSC | Project Steering Committee |
| RAS | Development Agency of Serbia |
| UNFCCC | United Nations Framework Convention on Climate Change |

Currency Equivalent

1 Serbian Dinar = 0.0097 United States Dollar

Weights and Measurements

Standard metric system utilized

Definitions and Glossary

| | |
|---------------------|------------------------------------------------------|
| Mean annual growth: | see mean annual increment |
| Annual growth: | Forest area multiplied by the mean annual increment. |

Definitions taken from: The Dictionary of Forestry, Helms J. (editor), CABI (1998):

| | |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Forest cover: | All woody growth occupying the ground in a forest as distinct from the ground cover. (Forest cover should not be mistaken with canopy cover, the latter also called crown closure or crown cover). |
| Mean annual increment: | The total increment of a tree or a stand (standing crop plus thinning) up to a given age divided by that age. |

Definitions taken from Forest Resource Assessment Working Paper 180, FAO (2012):

| | |
|--------------------------|---------------------------------------------------------------------------------------------------------|
| Growing stock: | Volume over bark of all living trees with a minimum diameter of 10 cm at breast height. |
| Non-wood forest product: | Goods derived from forests that are tangible and physical objects of biological origin other than wood. |

1) Executive Summary

1. In line with two of the main objectives of the GCF Project Concept "Enhancing the resilience of Serbian forests and the carbon storage potential of the country to support and boost the decarbonization process through adaptation and mitigation investments" this Working Paper focuses on addressing forest degradation in Serbia through sustainable climate adaptive forestry investments in the beneficiary regions of Central Serbia and the Autonomous Province of Vojvodina. The project has chosen to invest in both regions due to the high level of the annual wood harvest and the scope of forest and land degradation in the country. The interventions proposed in this WP are intended to give a significant contribution to the Intended Nationally Determined Contributions to the UNFCCC (2015).
2. Rural communities in both regions, especially in Central Serbia, are reported as the main vulnerable ones in Serbia. The rural population is heavily dependent on fuel wood being the cheapest and often only accessible source of energy in rural areas. This, in combination with wood fuel demand from abroad lead to widespread degradation of forests as a consequence of the continued extensive, mainly illegal fuel wood cutting at levels which cannot be sustained without further depleting the Country's forest resources.
3. The situation is further exacerbated by the utilization of inefficient wood stoves for heating and cooking and missing or poor thermal insulation of houses in rural areas. As a result, total national consumption of fuel wood in Serbia corresponds to an estimated 1.65 million cubic meter per year. The gap between officially recorded supply and estimated consumption of fuel wood is an indicator of lack of law enforcement and unauthorized or uncontrolled forest use.
4. Over the past decade, the Serbian government has also developed a number of policy and strategy documents with international technical and financial support and has undertaken several initiatives to address the issue of potential overexploitation of forest and tree resources. However multiple challenges are still ahead to halt extensive fuel wood cutting, as well as to bring other drivers of degradation, namely forest grazing and forest fires under control.
5. In order to stimulate the envisaged paradigm shift, the proposed interventions do not only focus on field level forestry investments at field level in the target regions, but also envisage developing guidelines on specific aspects of climate-adaptive forest management. The adoption of this guidelines in regular forest management planning, coupled with the developed capacities of all relevant stakeholder in sustainable and climate adaptive forest management, provides a high potential for scaling-up and replication of proposed interventions in both state-owned and private forest lands.
6. The project proposal has actively involved all relevant national and local stakeholders in the development process and will collaborate with ongoing projects and programmes in the Country, especially with the project on "Enabling environment at policy, field and market levels for Forest Landscape Restoration (FLR) to achieve Land Degradation Neutrality (LDN) in Serbia", in order to ensure the highest impact of proposed interventions and promote sustainable climate adaptive forest management with enhanced participation of communities on forest governance issues throughout the Country.

2) Introduction

7. In line with two of the main objectives of the GCF Project Concept "Enhancing the resilience of Serbian forests and the carbon storage potential of the country to support and boost the decarbonization process through adaptation and mitigation investments" this WP focuses on addressing forest and land degradation in Serbia through sustainable climate adaptive forestry investments in the beneficiary regions of Central Serbia and the Autonomous Province (AP) of Vojvodina. The project has chosen to invest in both regions since the level of the annual wood harvest is close to the annual growth of forests in the country [1] and the scope of forest and land degradation (64.7% of forests are coppice; 106,622 ha of salinated soils), both of which require urgent attention. The interventions proposed in this WP are intended to give a significant contribution to meet key objectives outlined in different strategic national forestry related policy documents, and to the Intended Nationally Determined Contributions [INDC] to the UNFCCC, in particular the commitment to increase the forest cover of Serbia to 41% by 2050 [2].
8. The rural population is heavily dependent on fuel wood as the cheapest and often only accessible source of energy in rural areas to meet their minimum energy needs for cooking and heating. This situation combined with the increasing export of wood fuels to satisfy the demand in particular from Western European countries over the last decades, lead to degradation of easily accessible forest stands (64.7% of the degraded coppice) as a consequence of the continued extensive often illegal fuel wood cutting at levels which cannot be sustained without further depleting the Country's forest resources.
9. The situation is further exacerbated by the utilization of inefficient wood stoves for heating and cooking and missing or poor thermal insulation of houses in rural areas. As a result, total national consumption of fuel wood in Serbia corresponds to an estimated 8 million m³ per year [1], which is about 88% of the estimated gross increment of forests in Serbia. The gap between officially recorded supply and estimated consumption of fuel wood is also an indicator of lack of law enforcement and unauthorized or uncontrolled forest use.
10. Over the past decade, the Serbian government has also developed a number of policy and strategy documents with international technical and financial support and has undertaken several initiatives to address the issue of potential overexploitation and other drivers of forest degradation, namely forest grazing and forest fires. In 2010 the government established the Budget Fund for Forests (BFF) to reverse the trend of forest degradation by financially supporting the implementation of corrective measures such as, among others, investments in afforestation and conversion of coppice forests.
11. The proposed interventions do not only focus on sustainable climate adaptive forestry investments at field level in the target regions, but also envisage developing guidelines on specific topics in relation to Climate Adaptive Silviculture (CAS) applicable in and for roll-out for the whole of the Country. The adoption of this guidelines in regular forest management planning, coupled with the developed capacities of all relevant stakeholder in sustainable and climate adaptive forest management, provides a high potential for scaling-up and replication of proposed interventions in both state-owned and private forest lands.
12. The envisaged interventions will create employment opportunities for the rural poor, especially for rural women in the seedling production and planting activities of the project. By involving people from communities adjacent to sites of intervention in all forest restoration activities (e.g. site preparation including access, fencing, planting, maintenance), field level interventions do not only provide temporarily employment in the involved communities, but acquired technical capacities and gained experience will help them to find jobs in the forestry sector in the future.

13. The project will therefore focus on both, field level sustainable, climate adaptive forestry investments as well as the empowerment of relevant stakeholders, especially from the Public enterprises responsible for managing state-owned forests and supervising activities in private forests, local authorities, community-based organizations, the private sector and civil society to embark on the process of introducing sustainable and climate adaptive forest management and enhanced community participation in forest governance throughout the Country.

3) Country Context

General situation concerning forests in Serbia

14. Serbia is a landlocked country located on the Balkan Peninsula (Central Serbia region) with hilly terrain and mountains dominating the southern third of Serbia. The low-land northern part of the country is separated from the central part by Sava and Danube rivers and belongs to the Pannonian basin (Vojvodina region). In the modern age, before the 18th and 19th centuries, around 75% of the actual territory of Serbia was covered by forests. Mainly due to demographic reasons and related land conversions into agricultural areas, especially grasslands, decreased the forest area to almost 15% before the Second World War.
15. With the establishment of a financial source for the “Protection and Improvement of Forests” in the 1960ies larger scale afforestation campaigns of the 60s/ 70s reverted the trend of a declining forest cover in Serbia. According to the results of the first National Forest Inventory (NFI) in 2008, forest cover accounts for about 30% of the territory, however, this is considerably less than the 41% projected for 2050 by the Land Degradation Neutrality (LDN) goals for Serbia defined under the LDN Target Setting Programme [3] and the national „Law on Spatial Planning of the Republic of Serbia“ [2]. In addition, the forest cover is quite different between the regions, with 37% in Central Serbia compared with 6% in Vojvodina region, as well as within the regions (see table 1).
16. Serbian territory is under warm temperate – fully humid climate type with warm summers (Cfb type according to Koppen-Geiger Climate Classification), with precipitation maximum during the late spring and early summer, e. g. during the June. Serbia is experiencing warming trend with accelerated temperature increase, and evident signal in trend of increase since 1980-ties. Negative impacts of temperature increase, especially in combination with precipitation inter-annual re-distribution toward extended drought periods and more extreme precipitation events, are recorded as increase in frequency and intensity of heat waves, floods, forest fires, and disturbance in food production and general ecosystem health, which is also predicted to continue, accelerate and intensify in the future.
17. According to the criteria of the International Union for Conservation of Nature, the Republic of Serbia is one of the six European and 153 world centers of biological diversity. It is one of the most important regions of biological diversity in Europe because it is characterized by great genetic, species and ecosystem diversity. The great species diversity of this area is shaped by the geographical position and the diversity of ecologically different habitats. The most important local and regional centers of ecosystem diversity in Serbia are great mountain massifs (Kopaonik, Šar planina, Stara Planina, Tara, Suva Planina and others), but also refugial canyon spaces like Djerdap gorges, Drina canyons, in which the largest number of endemic, relict or endemorelic communities can be found, that represents ecosystem richness and diversity.

| District | District area (ha) | Forest cover 2000 (%) | Increase (2000-2013) (%) | Decrease (2000-2013) (%) | Summary of changes (2000-2013) (%) | Absolute change in forest cover (2000-2013) (ha) |
|--------------------------------|--------------------|-----------------------|--------------------------|--------------------------|------------------------------------|--------------------------------------------------|
| BORSKI | 351733 | 38,618 | 0,002 | 0,004 | -0,002 | -789 |
| BRANIČEVSKI | 386780 | 38,410 | 0,003 | 0,002 | 0,001 | 481 |
| THE CITY OF BELGRADE | 323713 | 16,612 | 0,004 | 0,006 | -0,002 | -796 |
| ZAJEČARSKI | 363255 | 39,293 | 0,002 | 0,003 | 0,000 | -88 |
| ZAPADNO BAČKI | 248456 | 6,555 | 0,002 | 0,006 | -0,004 | -1031 |
| ZLATIBORSKI | 616114 | 43,389 | 0,011 | 0,002 | 0,008 | 5165 |
| JABLANIČKI | 276826 | 42,601 | 0,006 | 0,004 | 0,002 | 656 |
| KOLUBARSKI | 247463 | 29,777 | 0,002 | 0,002 | 0,000 | -14 |
| MAČVANSKI | 326808 | 26,600 | 0,002 | 0,002 | 0,000 | -22 |
| MORAČIČKI | 302495 | 46,162 | 0,008 | 0,002 | 0,006 | 1798 |
| NIŠAVSKI | 273459 | 32,558 | 0,003 | 0,003 | 0,000 | 70 |
| PIROTSKI | 276296 | 41,139 | 0,005 | 0,003 | 0,001 | 334 |
| PODUNAVSKI | 124187 | 9,569 | 0,001 | 0,000 | 0,001 | 89 |
| POMORAVSKI | 259805 | 37,019 | 0,002 | 0,002 | 0,001 | 152 |
| PČINJSKI | 351215 | 41,404 | 0,013 | 0,007 | 0,006 | 2246 |
| RASINSKI | 266537 | 40,048 | 0,007 | 0,001 | 0,005 | 1431 |
| RAŠKI | 392680 | 48,732 | 0,011 | 0,003 | 0,008 | 3094 |
| TOPLIČKI | 220999 | 45,583 | 0,004 | 0,003 | 0,001 | 274 |
| ŠUMADIJSKI | 237925 | 28,843 | 0,001 | 0,001 | 0,000 | -10 |
| CENTRAL SERBIA | 5598291 | 37,277 | 0,005 | 0,003 | 0,002 | 13959 |
| JUŽNO BANATSKI | 424254 | 8,009 | 0,003 | 0,003 | -0,001 | -293 |
| SEVERNO BAČKI | 402448 | 6,957 | 0,003 | 0,006 | -0,003 | -1273 |
| SEVERNOBANATSKI | 233036 | 1,710 | 0,001 | 0,002 | -0,001 | -205 |
| SEVERNOBAČKI | 178148 | 1,790 | 0,001 | 0,001 | 0,000 | -11 |
| SREDNJEBAATSKI | 326286 | 2,430 | 0,001 | 0,002 | -0,001 | -290 |
| SREMSKI | 347827 | 15,011 | 0,003 | 0,009 | -0,006 | -2030 |
| AP VOJVODINA | 2160456 | 6,718 | 0,002 | 0,005 | -0,002 | -5123 |
| KOSOVSKI | 312447 | 29,033 | 0,004 | 0,007 | -0,003 | -797 |
| KOSOVSKOMITROVAČKI | 205430 | 35,979 | 0,006 | 0,005 | 0,001 | 192 |
| KOSOVSKOPOMORAVSKI | 142930 | 26,562 | 0,009 | 0,012 | -0,003 | -484 |
| PEČKI | 255971 | 22,962 | 0,006 | 0,010 | -0,004 | -1140 |
| PRIZRENSKI | 174889 | 21,568 | 0,002 | 0,004 | -0,003 | -442 |
| AP KOSOVO* AND METOHIJA | 1091667 | 27,411 | 0,005 | 0,008 | -0,002 | -2668 |
| REPUBLIC OF SERBIA | 8850414 | 28,454 | 0,005 | 0,004 | 0,001 | 6047 |

*) "All references to Kosovo should be understood to be in the context of United Nations Security Council resolution 1244 (1999)."

Table 1 Forest cover change trends in the Republic of Serbia (2015) [4]

18. According to the official results (published in 2009) of the 1st National Forest Inventory (NFI) carried out from 2004-2006, the forest cover of Serbia amounted to 2 252 400 ha in 2008 or 29.1% of the total land area of the Republic of Serbia, with 37.6% of forest cover in Central Serbia and 7.1% in Vojvodina regions. The category "Other wooded land" (e.g. thickets), which by international definition includes also, shrubs and bushes [5], includes 4.9% of the territory, which is altogether 34.0% of the total area of Serbia. Natural high stands occupied 27.5%, coppice stands 64.7%, artificially established stands 6.1% and plantations (poplar and willow clones) 1.7% of the total forest area of Serbia.
19. In general, the status of both state and private forests is considered unsatisfactory due to the total growing stock of forests revealed by the results of the NFI in 2008 which is below the forests' potential capacities. The results indicated a low standing volume of about 161 m³/ha; a low annual increment of about 4.0 m³/ha; and an unfavourable structure.
20. However, state-owned forests with an active management of forest resources are characterized by a higher average volume of 185 m³/ha and annual increment of 4.5 m³/ha. Private forests are poorer in the quantitative sense, with average volume 133 m³/ha and current volume increment 3.5 m³/ha. Regarding the differences in productivity, it can be concluded that the loss in coppice forests is about 3,500,000 m³ per year compared to high forests. The percentage of plantations is a concern only at the local level, in forest areas and in state forests in which the percentage of plantations is higher than the country average.
21. Serbian forests of 2,252,400 ha out of which 1,498,000 ha (66.5%) are classified as forests with mainly productive function, contributed to about 2.3 percent of the national GDP in 2008. Although the forests' contribution to the GDP has been declining over the last decade to 1.4% in 2021 [6], forestry is, after agriculture, the most important activity in rural areas of the country. Yet its potentials are far from being fully utilized and do not factor in the value of important marketable forest ecosystem services (e.g. carbon removals, biodiversity and protection) [7].
22. In addition, commercial NWFP collection is possible (details under Law on Forests and Nature Protection further below), noncommercial collection is free (depending on volumes). Those accessing NWFP will not be impacted by the project activities.
23. However, forest degradation, along with resulting habitat loss and fragmentation, remains one of the key environmental problems at present, resulting in loss of forest carbon, biodiversity and other key ecosystem goods and services, including the potential to act as carbon sinks. Root causes of forest degradation include illegal extraction of timber, the overexploitation of wood biomass at local level due to the high forest dependency for energy, abandonment of rural areas, lack of financial and knowledge capital of land owners, more frequent forest fires, as well as pressures from the agriculture, energy and construction sectors. 2.5 million Serbian households, particularly in poor rural areas (41% of total households [8]), rely on fuelwood to cover their energy needs. It is estimated that about 6.47 percent of the total territory of Serbia is degraded (UNCCD default data 2001-2015). The annual cost of land degradation in Serbia is estimated at USD 254 million. This is equal to 7.6 percent of the country's agricultural GDP.
24. In a study carried out by FAO, it was found that woody biomass mainly deriving from forests or a combination of wood and other solid fuels for heating is used in 37.1% - or 934.237 - of Serbian households [9], as alternatives like electricity and natural gas are not financially accessible for the most and especially for the poor (10.5% of the total population in rural areas). Therefore, fuelwood extraction remains the main anthropogenic driver of forest degradation. In addition, based on climatic trends and projections, the adverse impacts from pests, diseases, fires and climatic hazard on forests due to climate change are projected to increase both in frequency and area. This will further reduce forest's capacity to provide for carbon removals as well as for ecosystem services (e.g. fuelwood, non-wood forest products, protection) for the people living in rural settlements.

25. **Legal framework and policies:** Serbia has been signing and ratifying 145 international environmental agreements, conventions such as CBD, UNFCCC, UNCCD, Ramsar etc.), protocols, etc., which are related to forests and their management, and which are integral part of the legal system and have supremacy over national laws. The relations in the field of forestry are mainly regulated by the Constitution of the Republic of Serbia, Law on Forests and Law on fees for the use of public goods, other legal acts (Law on Agricultural Land, etc.) may have indirect impact for the forest sector.
26. The "**Forestry Development Strategy of Serbia**" (FDS, 2006), the main strategic document for the forest sector, was adopted by the Government of the Republic of Serbia in 2006 with the main objective to address "conservation and improvement of the state of forests and the development of forestry from an economy perspective". One of the guiding principles of the Strategy is the multifunctional role of forests, in particular underlining the irreplaceable role of forests in climate change mitigation, and enhancing the capacity of forests to this end. More specifically, the Strategy emphasizes:
- a) The aim to increase of the forest cover in Serbia and thus to increase the contribution of forest sector to the State economy. For this purpose, the State committed itself to provide financial and legal assistance for afforestation on lands where it is economically and ecologically beneficial to have forests.
 - b) The aim to improve forest resources by conversion of coppice forest into productive high forests. For this measure State defined commitment for support of its implementation in legal and financial instruments of forest policy.
 - c) The aim to ensure the sustainable management of forests as well as the forests' vitality, health and protection in relation to abiotic and biotic factors which have negative impact on forests.
27. Research, international cooperation, knowledge transfers and support to private forest owners in sustainable forest management and establishing Private Forest Owners Associations (PFOA) are further clearly declared objectives of the Strategy. In contrast to previous forest related policy documents, the FDS does not explicitly define numerical targets for afforestation nor the conversion of coppice into productive high forests. The numerical targets for afforestation and conversion of coppice forests for a period of 10 years were specified in a separate document, namely the "Forest Development Programme on the Territory of the Republic of Serbia for the period 2011-2020" (FDP) with the action plan. However, the prepared FDP including action plan has never been adopted and requires to be updated and submitted for approval by the Government.
28. The "**Law on Forests**" (LoF, 2010) regulates the preservation, protection, planning, cultivation and use of forests, the disposal of forests and forest land, supervision of the law's implementation, as well as other important forest and forest land related issues.
- Article 3 states of the LoF provides for the conditions for sustainable forest management and forest land as good of general interest, in the manner and in the extent that it permanently maintains and improves their production capacity, biodiversity, renewability and vitality, and improves their potential to mitigate climate change, as well as their economic, ecological and social function, without causing damage to the surrounding ecosystems.
29. Article 4 defines the protection, preservation and improvement of forests as an activity of general interest, which shall, among others lead to 1) the prohibition of permanent reduction of areas under forests; 2) increase the national forest resources in terms of area and growing stock, as well as to increase the share of state owned forests (by purchasing private forests), especially in forests with a special purpose; 3) establishing, maintaining and using a national information system in forestry; 4) providing material, expert and advisory support to forest owners; 5) prohibition of alienation of state-owned forests, except in the cases provided for by this Law; and 6) conservation and protection of forests as environmental factors.

30. Article 6 on the economic functions of forests notably recognizes that forests also mitigate the harmful effects of greenhouse gases emissions by carbon sequestration, oxygen and biomass production, contribute to water purification, supply and protection of underground streams and sources of drinking water, as well as protection of land, settlements and infrastructure from erosion and landslides.
31. Article 9 prohibits any form of forest devastation and clearing, as well as clear-cutting which is not authorized as the regular form of forest regeneration. In addition, articles 11 and 12 define the compensation to be paid for changing forests and forest lands in other forms of land-use.
32. Article 52 on “grazing in forests and provision of fodder from forests” allows grazing, in particular pork grazing and collecting fodder only with permission of the user (i.e. Public enterprises (PEs) or private forest owner (PFO), and in accordance with the relevant Forest Management Plan (FMP) and if the forest is not in the phase of regeneration (either natural or artificial). In all cases, as part of the procedures established by the project, communities will be informed and engaged in all forestry investments. Areas selected for forestry investments will need to be clear from claims or conflicts and will have to be certified by Forest and municipal authorities prior to the investments.
33. Article 62 on “other forest products” (NWFP) allows the collection of other forest products (forest fruits, medicinal and other plants, use of stone, sand, gravel, humus, as well as beekeeping and others) after getting the permission of the user (i.e. Public enterprises (PEs) or private forest owner (PFO), and in accordance with the relevant Forest Management Plan (FMP) and its related annual executive plan.
34. In 2012, after abolishing Article 86 of the Law on forests which prescribed payments for ecosystem services, where each legal entity in Serbia should pay the amount of 0.025% of revenues to the fund for the improvement of forests, the main financial mechanism for the implementation of the strategic goals of the FDS and FDP progressive approach of payment for ecosystem services disappeared. The main vehicle for supporting the implementation of the strategic goals has become the Budget Fund for Forests (BFF). The BFF’s main source of income is a compensation fee for the utilization of forests and forest lands, which for State forest companies is 3% of the total annual income and for Private forest owners is set at 5% of the market value of wood products at the felling site. The second source of the BFF - as prescribed by Law on Forest - is the above-mentioned compensation for land-use change from forest to other land use categories in amount of the tenfold value of the forest which is subject to land-use change, or in amount of the fivefold value of the forest subject to land-use change, if the new land is to be used to by small scale renewable energy projects.
35. The LoF, despite abolishing the fee for ecosystem services, clearly supports the achievement of FDS objectives. With a view to climate change mitigation and land degradation, it positively contributes to reducing negative impacts in particular through: i) the prohibition of reducing the area under the forests, ii) support of afforestation activities via the BFF, iii) conversion of coppice forests into high forests and iv) support of measures for forest protection.
36. The “**Law on Agricultural Land**” (LoAL, 2006) regulates planning, protection, spatial planning of agricultural land and use of agricultural land, supervision of the law’s implementation and other issues of importance for the protection, arrangement and use of agricultural land as a property of general interest. This law relates to afforestation to a great extent, mainly concerning the approval of using agricultural land for non-agricultural activities. The law also defines counter-measures that are taken in order to protect agricultural land from the harmful effects of erosion and torrents in the erosion area. One of these measures affects forest management on forest parcels as the LoAL prohibits the felling of forests and forest plantations above endangered agricultural parcels.
37. One of the provisions of the Law is that arable agricultural land can be used for non-agricultural purposes on several occasions, for example for establishing meadows and pastures on arable

agricultural land of cadastral classes IV and V, as well as for establishing forests irrespective of the cadastral class upon previously obtained consent of the MAFWM. This provision is to the certain extent contradictory to the provision within article 22 which defines that it is forbidden to use arable agricultural land of the cadastral classes I - V for non-agricultural purposes. This requires and often discourages a potential investor who has an intention to establish new forest, to start an administrative procedure of changing the land use class before afforestation, which sometimes takes a very long time and may imply substantial costs.

38. Forestry and the agriculture sector should find a common platform for minimizing conflict situations in order to define the necessary procedures for eliminating administrative and sectoral barriers in order to reduce the transaction costs in relation to afforestation investments. This is especially important in Vojvodina, a region with only 7.1% of forests according to data of the 1st NFI. Cooperation between the cadaster and the forestry sector should be established for the purpose of mutual exchanges and updating of the categories of land under forests, where the forestry sector plays an important role in the adequate and timely updating of forest land use categories in exchange for quick and inexpensive access to cadastral parcels.
39. The **“Law on Fees for the Use of Public Goods”** (2018) settles fees for use of public goods, including forests, forest land and agricultural land. It states that fee for use of agricultural land for non-agricultural purposes is not paid in two cases:
 - a) Afforestation of agricultural land when the Agricultural management plan or Recultivation project determines that the land will be used more rationally if it is afforested, regardless of class, with the previously obtained consent of the Ministry in charge of agricultural affairs;
 - b) Establishing of shelterbelts.
40. The **“Law on Use of Renewable Energy Sources”** (2021) regulates the use of energy from renewable sources, as well as that the use of energy from renewable sources is in the public interest of the Republic of Serbia and of special importance for the Republic of Serbia. The law defines, among other things that both forest and agricultural biomass are renewable energy sources, as well as that agricultural biomass represents biomass produced in agriculture, and that forest biomass represents biomass produced in forestry. This Law defines the sustainability criteria and their verification for biofuels, bioliquids and fuels from biomass obtained from forest and agricultural biomass. These criteria will be defined in the near future.
41. The **“Law on Nature Protection”** (2009) obliges to implement sustainable forest management based on the principles of sustainable development, protection of biodiversity, preservation of natural composition, structure and function of forest ecosystems, and in accordance with the conditions of nature protection as an integral part of forest management planning. This obligation entails that forest clearings (meadows, pastures, etc.) and forest edges are preserved to the greatest extent.
42. In relation to the collection of NWFP the law on nature protection prescribes that commercial collection is authorized - within a certain quota- but permission from the competent Ministry (now Ministry of Environmental Protection) is required. Noncommercial collection is free.
43. **Institutional setup and governance in the forestry sector:** Administrative affairs in relation forestry are organized on central (state) and in the case of the Autonomous Province (AP) of Vojvodina on provincial level.

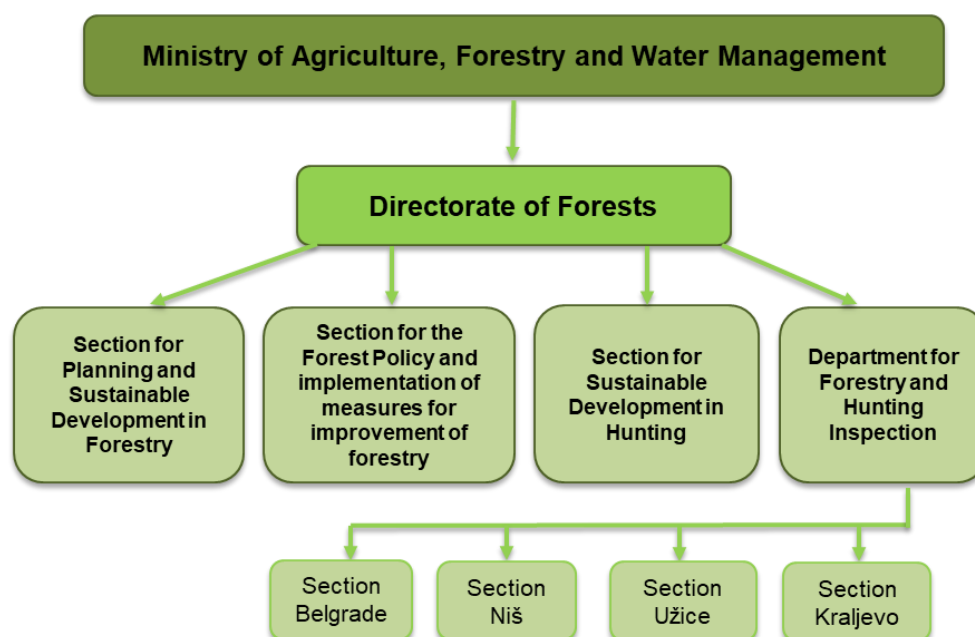


Figure 1 Directorate of Forests - institutional set-up (Source: unpublished organigram of the DoF, 2023)

44. The **Ministry of Agriculture, Forestry and Water Management** (MAFWM) was established in 2017 when, in accordance with the Law on Ministries of 29 June 2017, it succeeded the former Ministry of Agriculture and Environmental Protection, and re-established in 2020, by the amendments of the Law on Ministries.
45. The **Directorate of Forests** (DoF) is an administrative body within the MAFWM that performs state administration and professional tasks determined by the Law of Ministries related to: forest policy, forest conservation, promotion and use of forests and wildlife, implementation of measures for the protection of forests and wildlife, control of seeds and planting material in forestry, inspections in the field of forestry and hunting. The Directorate of Forests is structured into three sections and one department.
46. The **Section for the Forest Policy and Implementation of Measures for Improvement of Forestry** performs tasks related to: preparation of groundwork for determining and implementing the policy in the field of forestry; preparation of groundwork for drafting laws and by-laws in the field of forestry; development of the FDP of the Republic of Serbia; preparation of analyses, reports, information and other expert and analytical materials in the field of forestry; preparation of a financial plan for support servicing private forests; preparation and implementation of public announcements - for the allocation of incentive funds for the budget for the improvement of forestry; monitoring the realization of contracted works from the budget funds for the improvement of forestry; defining the areas, the types and quantities of forest reproductive material for afforestation; monitoring the state of production of forest seed and planting material and preserving the genetic variability of forest species as well as proposing measures for the improvement of this activity; organizing seminars for professionals of DoF, and other related tasks.
47. The **Section for Planning and Sustainable Development in Forestry** performs activities related to: participation in the development of strategic and planning documents in forestry; monitoring, analysis and approval of forest management planning documents; providing expert opinion on amendments, drafts and proposals of laws, proposals of other regulations and general acts; preparation of contributions for relevant programing and strategic documents of importance for the fulfillment of obligations and achievement of goals and competencies of the Directorate in the field of international relations; assessment of expert findings related to the assessment of the value of forests and forest land for the purpose of land use change; preparation of opinions on regulations, planning and other acts in the field of environmental protection, spatial planning and

other relevant sectors and their implementation in strategic and planning documents in forestry; maintaining a national Forest Information System (FIS); records on basic statistical indicators of forestry of the Republic of Serbia; monitoring and analysis of data on the execution of annual forest management plans; monitoring the implementation of entrusted tasks in the forests of individual owners; protection of forests from plant diseases, pests and fires as well as monitoring and proposing measures for their control; organization of professional seminars and conferences related to the development and implementation of planning documents in the field of forestry; as well as performing other tasks in this area.

48. The **Section for Planning and Sustainable Development in Hunting** performs activities related to: proposing measures for improving the game management; preparation of groundwork for drafting regulations in the field of hunting; giving consent on the management plans for hunting ground management and annual hunting ground management plans; monitoring the implementation of approved game management plans for individual hunting grounds; preparation of a financial plan in the part related to funds for the development of game and hunting; defining measures and activities for the allocation of budget funds in the field of hunting; organizing seminars for professionals and conferences within the scope of the Section; performs other tasks in this area.
49. The **Department of Forestry and Hunting Inspection** within Directorate of Forests performs tasks related to: supervision of the performance of hunting grounds; supervision of the implementation and enforcement of laws and other regulations in the field of forestry, forest seed and planting material, forest protection and hunting; monitoring the implementation and enforcement of standards; overseeing the implementation of laws and other regulations and acts related to forests within national parks; supervision of the implementation of public authority tasks by enterprises and other organizations entrusted with the exercise of public authority; coordinating the inspectors work at field level; participation in providing inputs for drafting regulations and other general acts within the scope of the responsibility of the DoF; participating in the preparation of reports, answers to parliamentary questions and petitions related to the scope of the Department; providing opinions, instructions and guidelines for the application of regulations; providing expert assistance to inspectors in the supervision and enforcement of forestry and hunting laws and regulations; drafting of requests for initiation of criminal proceedings, appeals and appeals against decisions of judicial bodies issued upon submitted requests.
50. The **Ministry of Environmental Protection** (MEP) was established in 2017. It oversees the implementation of the Law on Nature Protection and in this context has to agree to the forest management plans prepared by the PEs.
51. Educational and research institutions such as the **Faculty of Forestry** and the **Faculty of Mechanical Engineering** have a special role in the forestry and biomass sector, dedicated to the education of experts for forest management, biomass production and utilization. Research institutions such as **Institute for Forestry from Belgrade**¹ and **Institute for Lowland Forestry and Environment** from Novi Sad do research on all aspects in relation to forests and forestry, and have been part of projects which are implemented in the field of Climate Change. However, these institutes currently do not serve as research provider for MAFWM to support tailoring science-based climate change adaptation and mitigation measures, because there are under the jurisdiction of the Ministry for education, science and technological development. Both research institutes are engaged in the International Co-operative Program on Assessment and Monitoring of Air Pollution Effects on Forests which is operating under the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP).

¹ Institutes from Belgrade and Novi Sad were under the jurisdiction of Ministry of Agriculture, Forestry and Water management until 2012, but from this moment, Institutes are under the jurisdiction of Ministry for Education, Science and Technological Development

52. The two PEs Serbia Shume and Vojvodina Shume” are the main responsible for forest management in Serbia. **PE Serbia Shume** (PES) is in charge of forest management of state-owned forests in Central Serbia, while **PE “Vojvodina Shume”** (PEV) manages state-owned forests in the territory of AP Vojvodina. Both enterprises provide technical support to private forest owners, including drawing up of management plans, tree marking and other advisory functions. **Public Enterprises of National Parks** are managing forest and other land within the territory of National parks, which account for 1.64% of the total area of Serbia or 5.05% of the total forest area in the country. The national parks are: NP “Djerdap”, NP “Kopaonik” and NP “Tara” in the territory of Central Serbia and NP “Fruška Gora” in the territory of AP Vojvodina, and each of these National parks is managed by a different state enterprise.
53. NGOs, especially environmental NGOs, are recently playing an increasingly prominent role on climate change and renewable energy matters. In the field of forestry there are only a few NGOs, with the **Forestry Youth Movement** (“Pokret gorana”) being the oldest and most influential non-governmental organization in the forestry sector. The main task of this NGO is to improve the state of forests and the environment in Serbia through educating young people (from school age), but also field activities, namely small-scale nursery production and afforestation interventions. In addition, the Chamber of Forestry Engineers of Serbia, as a recently established organization, is dedicated to further training and licensing of forestry professionals. Among the international NGOs, the WWF is certainly the most influential when it comes to forestry.
54. The number of PFOs is estimated to be at least 900,000 with an average size of the forest holding of about 1.27 ha and an average size of the individual forest plot of about 0.3 ha [10], but private forests account for 47% of the total forest area of the country. However, only a small proportion of which is organized in Private Forest Owners associations (PFOAs). In addition to individual owners, the Serbian Orthodox Church is the largest “private” forest owner after restitution, which began in 2006 following the enactment of the Property Restitution Act. By 2016, 33,063 ha of forests and forest land had been restituted. The Church manages forests either through companies it has established in accordance with the Law on Forests or signs contracts with public or private forest management companies. There are no other large private forest owners besides the church.
55. Due to the high number of Individuals forest owners and the average size of forest properties, the private forests can be characterized as “unmanaged” in the absence of short or long-term of forest management planning. For more than two decades, the DoF as well as a number of projects tried to organize the owners of private forests to move towards sustainable management, but with limited success even when there are subsidies provided by the BFF. Presently, 17 PFOAs are active and requesting support from BFF for their activities.
56. **The regional administrations:** The bodies of the Autonomous Province of Vojvodina are the Provincial Government and the Provincial administration.
57. The direct responsibility for forestry rated matters lies with the **Provincial Secretariat for Agriculture, Forestry and Water Management**. The Secretariat is structured into sectors and one department, the **Sector for Forestry** performs study-analytical and administrative-legal activities, documentation as well as statistical-recordkeeping. The Sector for Forestry monitors the situation in the ground in relation to forestry, prepares production forecasts, but also prepares acts to ensure that public interest is protected in relation to forests. In accordance with the Law on Forests, the Sector for Forestry as well as the **Department for Forestry and Hunting Inspection** performs almost the same tasks as the DoF but on the level of the AP of Vojvodina.
58. It is important to note that there are certain competencies in relation to forests within the Provincial Secretariat for Urbanism and Environmental Protection, namely in the context of the Secretariat’s responsibility on i) spatial and urban planning and environmental protection as well as ii) continuous control and monitoring of the state of the environment in AP Vojvodina.

59. **Local self-administration bodies (i.e. communities):** The bodies of local self-government consist of the city (municipal) council and the city (municipal) administration. However, local self-administration bodies have no jurisdiction over the forests neither in Central Serbia nor the AP of Vojvodina.
60. **Municipalities:** The municipality is the basic territorial unit in which local self-government is exercised, which is capable of independently performing all rights and duties within its competence through its bodies and which has at least 10,000 inhabitants, although some of them can have less than 10,000 inhabitants if economically, historically or geographically justifiable. In the exercise of its competence, the unit of local self-government issues regulations independently, in accordance with its rights and duties determined by the Constitution, law, other regulations and the statute. The rights and obligations of local self-government units in the exercise of the entrusted competencies and powers of the Republic of Serbia and the autonomous provinces in the supervision over the exercise of the entrusted competencies are regulated by law.
61. The Municipality performs certain tasks of inspection supervision in the field of education, health, environmental protection, mining, trade in goods and services, agriculture, water management and forestry and other inspection activities in accordance with the law. There are 174 Municipalities in the Republic of Serbia. Only few municipalities have established organisations/enterprises for forest management.

4) Project Area Context (related to the topic of the Working Paper)

Project area "Central Serbia"

62. Central Serbia is not a special administrative unit but is under the direct jurisdiction of the Republic. Central Serbia covers the central part of the country with its hilly terrain traversed by rivers, and the southern third of Serbia dominated by mountains. It is comprised of four regions: Belgrade region, Region of Šumadija and Western Serbia, Region of Eastern Serbia and Region of South and Eastern Serbia. Central Serbia has a total surface of 55,975 km² that represents 63.25% of the of the country's territory. Population of the Central Serbia Region is 5,058,274 inhabitants, where the majority lives in urban areas. Belgrade region is outstanding for its highest population density – 524 inhabitants per km² and its population density is more than five times higher when related to the other regions. Population density in Region of Šumadija and Western Serbia is 71 inhabitants per km², while the lowest population density was noted for Region of South and Eastern Serbia – 56 inhabitants per km² [8]. Central Serbia is divided into 17 districts with 19 cities and 103 municipalities, and City of Belgrade as separate administrative unit with 17 municipalities. [11]
63. Central Serbia covers three mountainous systems: Carpathian-Balkan Mountains in the Eastern part, Dinarides mountains in the Western part and Rodopy Mountains in the southern-eastern part of the country. Only few mountain peaks in Central Serbia are higher than 2000 m. a.s.l., and the highest one is Midžor at Stara Planina Mountain with an altitude of 2168 m a.s.l. while there are more than 20 mountains with an altitude from 1500 to 2000 m a.s.l.
64. The climate of Central Serbia can be described as temperate continental with more or less pronounced local characteristics. The spatial distribution of climate parameters is conditioned by geographical position, relief and local influence, terrain exposure, presence of river systems,

vegetation, urbanization, etc. Annual precipitation amounts increase on average with altitude. In the lower regions the annual precipitation ranges from 540 to 820 mm, areas with altitude over 1000 m have 700 to 1000 mm, and some mountain peaks in southwestern Serbia receive up to 1500 mm. Most of Serbia has a continental precipitation regime, with more quantities in the warmer half of the year, except in the southwestern parts where the highest precipitation is measured in autumn. [12].

65. Economy of Central Serbia is very diverse. As a part of Serbia rich with natural resources, primary sector that includes agriculture and forestry is the basis of development in rural areas. Favorable natural conditions offer the space for the development of diverse agricultural production: cereals, industrial plants, grapes, fruits and vegetables, seeds and planting material, medicinal plants, large and small livestock. The development of primary agricultural production has enabled and development of the food industry: confectionery, oil industry, sugar, beer, juices, vegetable processing industry, flour, meat, etc. Mining industry is also very well developed, having on mind that the largest share of electricity in Serbia is still produced from lignite. In addition, the mines in Bor and Majdanpek in the Eastern part of Serbia are producing gold and copper. In the last decade Central Serbia offered a space for the development of the automotive industry. Serbia is an attractive tourist destination. Natural Resources enable the development of spa, mountain, sports and recreational, river and hunting tourism. The share of the tourism and hospitality industry in the social product of the Republic of Serbia is about 3%. [13]
66. Forest cover of the Central Serbia region is 37.6% according to the results of the 1st NFI, while other wooded land covers 6%. The biggest forest complexes are found in the mountainous parts of Central Serbia, with broadleaves prevailing in the Eastern part and conifers in western part of the country. The majority of forests is privately owned. , mainly by physical persons while State owns smaller portion. Around 90% of state-owned forests in Central Serbia are managed by PE Serbia Shume, while the remaining state-owned forests are managed by PE “National park Tara”, PE “National park Kopaonik”, PE “National park Djerdap”, the Faculty of Forestry “Belgrade” and several other PEs established by local self-governments.
67. In accordance with the Law on Forests private forests of physical persons are managed by their owners, while professional activities in these forests are provided by PE Serbia Shume” and the PEs of the National Parks. Two PFOAs established their own service for forest management. Private forests owned by the Serbian Orthodox Church are either managed by enterprises established by the Church, or by private companies contracted by the Church.

| | State (ha) | Private (ha) |
|------------------------------|-------------------|---------------------|
| PE Serbia Shume | 893,203.50 | 1,224,751.00 |
| PE “National park Tara” | 20,000.00 | 27,000.00 |
| PE “National park Kopaonik” | 7,077.02 | 350.22 |
| PE “National park Djerdap” | 37,000.00 | 12,150.00 |
| Faculty of Forestry Belgrade | 5,809.00 | - |
| PE Shume Goč | 8,189.85 | 3,980.00 |
| Serbian Orthodox Church | - | 23,195.73 |
| TOTAL | 971,279.37 | 1,291,426.95 |

Table 2 Key figures for forest lands (state/private) in Central Serbia (Source: official websites of PEs) [14]

Project area “Autonomous Province of Vojvodina”

68. Vojvodina is an autonomous province (AP) that occupies the northern part of Serbia, bordered to the south by the national capital Belgrade and the Sava and Danube Rivers, with Novi Sad being

the second-largest city in Serbia and administrative center of the region. Vojvodina has a total surface area of 21,500 km² (about 28% of the country's territory) and a population of 1,840,852 inhabitants (911 thousand live in towns, 929 thousand in villages) in 2020 [8]. The density of the population in the region is 85 persons per square km. AP Vojvodina is administratively divided into seven districts with 45 municipalities and cities [15] of which 8 are considered urban, and 37 are considered rural. Vojvodina is also part of the Danube-Kris-Mures-Tisa euroregion.

69. Vojvodina occupies the southeast part of the Pannonian Plain which remained when the Pliocene Pannonian Sea dried out, and is rich in fertile loamy loess soil, covered with a layer of chernozem type of soil. The most distinctive landscape features are two mountains, namely Fruška Gora Mountain in the west and Vršac Mountain (with the highest peak in Vojvodina, 641 m above sea level) in the south-eastern part of the region.
70. The climate of the area is moderate continental, including cold winters and hot and humid summers. The Vojvodina climate is characterized by a vast range of extreme temperatures and very irregular rainfall distribution per month [16]. As a region with highly productive agricultural soil, it is subject to, and endangered by, different destructive processes, primarily wind erosion. Wind erosion, as a very destructive factor, causes detachment and transport of the most fertile particles of the arable topsoil, permanently changing its fertility properties, and the droughts also reduce the yield.
71. The economy of Vojvodina is largely based on a developed food industry and fertile agricultural soil. Agriculture has always been a significant part of the local economy and remains a priority sector in Vojvodina. The share of agribusiness in the total exports of Vojvodina is 10.3% (or 22.4% with food and drink) [Vojvodina Development Agency, 2019-2020]. The metal industry has also a long tradition in Vojvodina, but other branches of industry are as well quite developed such as the chemical, electrical, oil industry and construction industry, and more recently the ICT sector. Vojvodina pays particular attention to interregional and cross-border economic cooperation, as well as to implementation of priorities defined within the EU Strategy for the Danube Region [15].
72. Forests in Vojvodina are very unevenly distributed and mostly located along rivers where they form smaller or larger forest complexes. In addition, there are significant forest areas in the hilly and mountainous parts (Fruška gora, Vršački breg) and the undulating hills of the Deliblato Sands. Most of the forests in Vojvodina are state-owned and managed by the Public Enterprise Vojvodina Šume and a smaller part is managed by PE National park „Fruška gora“.
73. There is a certain difference between the geographical and forestry district boundaries of Vojvodina and the administrative borders of AP Vojvodina, due to the organization of the state administration. Parts of Srem and Banat in the vicinity of Belgrade administratively belong to the City of Belgrade, and the forests located in that area do not fall under the responsibility of the Provincial Secretariat for Agriculture, Forestry and Water Management. There are also parts that do not belong to Vojvodina in the geographical sense, but for the same reasons (due to the organization of the state administration) administratively belong to AP Vojvodina. These are the areas south of the Sava in the vicinity of Sremska Mitrovica.

| Ownership | area (ha) | Forest and Forest land | | | | Other land | | |
|--------------------------------|-------------------|------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | | In total | Natural forest | Forest culture | Forest land | In total | Barren land | Other purposes |
| State - PC "Vojvodinašume" | 128,704.16 | 113,614.25 | 62,076.23 | 36,534.79 | 15,003.22 | 15,089.91 | 8,351.85 | 6,738.06 |
| State - other | 17,694.04 | 12,264.71 | 6,088.97 | 3,321.32 | 2,854.42 | 5,429.33 | 3,300.96 | 2,128.37 |
| State - NP Fruška gora | 23,369.53 | 22,347.08 | 21,435.70 | 401.99 | 509.39 | 1,022.45 | 90.94 | 931.51 |
| State in total | 169,767.73 | 148,226.04 | 89,600.90 | 40,258.10 | 18,367.03 | 21,541.69 | 11,743.75 | 9,797.94 |
| Serbian Orthodox Church | 3,718.39 | 3,249.50 | 1,062.52 | 1,784.87 | 402.11 | 468.89 | 355.57 | 113.32 |
| Private forests | 3,484.55 | 2,896.69 | 2,628.78 | 119.90 | 148.01 | 587.86 | 1.38 | 586.48 |
| State | 169,767.73 | 148,226.04 | 89,600.90 | 40,258.10 | 18,367.03 | 21,541.69 | 11,743.75 | 9,797.94 |
| Private | 7,202.94 | 6,146.19 | 3,691.30 | 1,904.77 | 550.12 | 1,056.75 | 356.95 | 699.80 |
| IN TOTAL | 176,970.67 | 154,372.23 | 93,292.20 | 42,162.87 | 18,917.15 | 22,598.44 | 12,100.70 | 10,497.74 |

Table 3 Key figures for forest land in AP Vojvodina (Source: internal data of PE "Vojvodinašume")

5) Sector Performances

74. **Management of state-owned forests** (53% of Serbian forests): In accordance with the Law on Forests (2010) and the Law on Public Enterprises (2012) the responsibility for the management of state-owned forests was transferred to PEs Serbia Shume and Vojvodina Shume". The national parks (Fruška gora, Djerdap, Kopaonik and Tara) are managed by special public enterprises in accordance with the Law on National Parks.

75. **Public Enterprise for Forest Management Serbia Shume (Belgrade)**: The PE has been founded by the National Assembly of the Republic of Serbia - Decision No. Pr. 101 dated 29th July 19. Assets disposed of by PE Serbia Shume are state-owned. In 2021 the PE provided employment for 3,243 full-time employees with different levels of education, namely:

| <i>Employee Structure</i> | |
|------------------------------------------------------------------|-------|
| Full-time employees (Bachelor's degrees): | 963 |
| Full-time employees (Secondary education): | 1,553 |
| Full-time employee (Highly qualified, Qualified, Non-qualified): | 727 |

76. The Public Enterprise for Forest Management Serbia Shume performs strategic, development and coordination activities and supervision of work of sections (branches) of the Company. Organisational structure of the Headquarters consists of sectors. Forest estates are established on the level of forest land areas and their organisational structure consists of Forest sub-estates which are the basic units for planning and organisation of forest management activities in the field.

77. The Company's main scope of activities comprises: silviculture and forest protection, maintenance and forest regeneration, seed and nursery production, growing of new forests and forest intensive plantations, forest use including non-wood forest products, hunting and game breeding, agricultural production and fishery, management of protected areas, tourism and catering, wholesale and retail trade.

78. PE Serbia Shume Belgrade manages state-owned forests and forest land on an area of 893,203.50 ha, in addition the PE performs and organizes professional affairs and supervision in private forests.in private forests on an area 1,224,751 ha [\[17\]](#).

| | |
|---------------------------------------------|------------|
| Total surface area – wooded & unwooded (ha) | 893.203,50 |
|---------------------------------------------|------------|

| | |
|-----------------------------------------------------------------------------------------|---------------|
| Forest area – wooded land (ha) | 772.148,93 |
| Forest area – other wooded land (ha) | 121.054,57 |
| Total timber volume (m3) | 132.771.379,2 |
| Average timber volume (m3/ha) | 172,0 |
| Total volume increment (m3) | 3.497.107,5 |
| Average volume increment (m3/ha) | 4,5 |
| Planned yield – 10 yrs. (m3) | 21.786.730,3 |
| Planning of timber volume production (m3) | 1.769.751 |
| Professional-advisory service activities in forests owned by natural/legal persons (ha) | 1.224.751 |

Table 4 Key figures for state-owned forests managed by PE Serbia Shume [17]

79. **Public Enterprise for Forest Management Vojvodina Shume (Petrovaradin):** Most of the forests in Vojvodina are managed by the PE Vojvodina Shume which manages state-owned forests, and organizes professional affairs and supervision in private forests.
80. The Public Enterprise for Forest Management Vojvodina Shume performs strategic, development and coordination activities and supervision of work of sections (branches) of the Company. Organisational structure of the Headquarters consists of sectors. Forest estates are established on the level of forest land areas and their organisational structure consists of Forest sub-estates which are the basic units for planning and organisation of forest management activities in the field.
81. Apart from forest estates, there are two additional sections, namely Vojvodina Shume – Lovoturs Petrovaradin specialised in hunting and game breeding and Vojvodina Shume-Turist functioning as tour operator.
82. The Company's main scope of activities comprises: silviculture and forest protection, maintenance and forest regeneration, seed and nursery production, growing of new forests and forest intensive plantations, forest use including non-wood forest products, hunting and game breeding, agricultural production and fishery, management of protected areas, tourism and catering, wholesale and retail trade as well as research and development.
83. PE Vojvodina Shume has 1,448 full-time employees (as of 31 December 2021) with different levels of education, namely:

| Employee Structure | |
|------------------------------------------------------------------|-----|
| Full-time employees (Bachelor's degrees): | 244 |
| Full-time employees (Secondary education): | 529 |
| Full-time employee (Highly qualified, Qualified, Non-qualified): | 675 |

84. In 2008, PE Vojvodina Shume received a FSC certificate (SGS-FM/COC-005064) for sustainable forest management according to the individual forest management model, the only such in the wider region, with SGS Qualifor controlling and confirming that the management and use of forests in accordance with strict international standards. In accordance with the certification system's rules of having a complete assessment of all business operations every five years, two new recertification cycles of PE Vojvodina Shume started in 2013 and 2018. According to wood volume of tree species, the main species are pedunculate oak which cover 35% and a lot of poplars sorts (clones) which cover 21% of total the Company's area.

| Forest estate | Total area (ha) | Forests (ha) | Remaining land (ha) | Timber (Standing wood volume) (m ³) | Growth (Annual wood increment) (m ³) | Average planned annual cut brutto volume (m ³) |
|---------------|-----------------|--------------|---------------------|-------------------------------------------------|--------------------------------------------------|------------------------------------------------------------|
|---------------|-----------------|--------------|---------------------|-------------------------------------------------|--------------------------------------------------|------------------------------------------------------------|

| | | | | | | |
|---------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Sr. Mitrovica | 42,399.16 | 38,836.84 | 3,562.32 | 13,744,830 | 322,509.80 | 241,165.80 |
| Pančevo | 50,321.63 | 33,663.19 | 16,658.44 | 4,327,852 | 200,248.30 | 203,124.60 |
| Novi Sad | 13,031.28 | 10,371.91 | 2,659.37 | 1,933,563 | 114,035.30 | 131,672.70 |
| Sombor | 24,514.55 | 19,091.85 | 5,422.70 | 3,673,791 | 131,332.50 | 139,756.60 |
| Total | 130,266.62 | 101,963.79 | 28,302.83 | 23,680,036 | 768,125.90 | 715,719.70 |

Table 5 Key figures for state-owned forests managed by PE "Vojvodina Shume" [18]

85. **Public Enterprise National Park "Fruška Gora" (Sremska Kamenica):** The second most important user of forests in Vojvodina is the PE National Park "Fruška Gora", which manages state-owned forests, but also organizes and monitors the management of private forests within the boundaries of the national park. According to the Law on Forests, these forests represent a specific entity in relation to other forest districts. The PE comprises five forest administrations: Erdevik, Ležimir, Beočin, Sremska Kamenica and Vrdnik. The total area managed by the national park are slightly less than 8% of the total forest area in Vojvodina.
86. **Institute for Lowland Forestry and Environment (Novi Sad):** The third organization that manages a part of Vojvodina's forests is the Institute for Lowland Forestry and Environment (ILFE). The area managed by this organization is very small, less than 1% of the total forest area in Vojvodina. Nevertheless, this Institute is of great importance for forestry in Vojvodina because it provides a wide range of services to other forest users (forest protection, habitat research, technology of planting and growing forests, nursery production, management planning, etc.).
87. Another 7% of the total forest area in Vojvodina is managed by the **Public Water Company "Vode Vojvodine"**. Although the company's main activity is not forestry, this company has certain organizational, personnel and technical capacities for performing forestry activities and manages forests in the protection zone of rivers, canals and other watercourses in Vojvodina.
88. In addition, there are **two military institutions**, namely Karađorđevo and Morović, which have the personnel and technical capacities for performing forestry activities and which manage more than 3% of the total forest area in Vojvodina
89. **Management of private-owned forests** (47% of Serbian forests): Professional and technical support to private forest owners is mainly provided by the **PEs Serbia Shume and Vojvodina Shume**, but also by the **PEs for National parks** (Fruška gora, Djerdap, Kopaonik and Tara). In addition, **two PFOAs** provide professional and technical support to their members. In contrast to Central Serbia the share of private-owned forests in AP Vojvodina is less than 5%.
90. An important change in the ownership structure has taken place in the last 10 years, when a significant area of state-owned forests has been returned to churches through the restitution process. Recognizing the fact that churches become private owners of forests with an area of more than 100 ha, in accordance with the Law on Forests (2010), they are obliged to organize a professional forest management. Some of the monasteries have their own forest holdings where they engage the necessary staff (licensed forestry engineers, technicians, etc), while others engage professional private companies for forest management.

Overall performance of the Forest Sector in Serbia

91. According to data provided by the Statistical office of the Republic of Serbia, the annual felling has steadily been increasing during the last decade with the exception of the year 2020 when production was affected by Covid-19 pandemic restrictions and sufferers. The largest share of production is fuel wood (more than 50%), followed by industrial and technical wood with around

40% of the total wood harvest and the rest of the production is classified as wood residue.

| Group of assortments/ Year | Felled wood volume (m ³) | | | | |
|-------------------------------|--------------------------------------|------------------|------------------|------------------|------------------|
| | 2016 | 2017 | 2018 | 2019 | 2020 |
| Industrial and technical wood | 1,233,246 | 1,250,795 | 1,275,900 | 1,368,649 | 1,258,553 |
| Firewood | 1,594,761 | 1,641,564 | 1,645,197 | 1,648,540 | 1,604,871 |
| Wood residue | 331,462 | 324,984 | 347,760 | 354,001 | 316,803 |
| TOTAL | 3,159,469 | 3,217,343 | 3,268,857 | 3,371,190 | 3,180,227 |

Table 6 Total volume of wood production grouped by assortments [19]

92. According to the data of the Serbian Chamber of commerce which uses the data from the Statistical Office of the Republic of Serbia as a basis for calculating of the forest sector's contribution the overall performance of the country, the Gross Value Added (GVA) for forestry including logging is lowest (4.0% GVA) in the section of "Agriculture, Forestry and Fishing", and amounts to EUR 108.1 million in 2018.
93. The GVA of the wood processing, furniture and paper industries amounted to EUR 592.5 million, which accounts for 1.7% of the total realized GVA of the Republic of Serbia in 2018, with the real growth rate of 4.8%. The same data shows that in the structure of the GVA of the section of "Manufacturing industry", the largest share in relation to forestry is recorded in the manufacture of paper and paper products, 3.2% of the manufacturing industry (EUR 196.2 million). In the manufacture of wood and of products of wood and cork; except furniture; manufacture of articles of straw and plaiting materials, the realized GVA amounts to EUR 148.0 million (2.4% of the manufacturing industry), and in the manufacture of furniture, it amounts to EUR 140.3 million (2.3% of the manufacturing industry).
94. The highest year-on-year GVA growth rate was registered with the manufacture of furniture (7.5%), whereas the lower growth was noted in the manufacture of paper and paper products (5.6%) as well as with forestry and logging (4.7%). The lowest increase in the GVA (1.4%) was recorded in the manufacture of wood and of products of wood and cork; except furniture; manufacture of articles of straw and plaiting materials.
95. Based on the available data, industrial production in the activity of wood processing and wood products, except for furniture in 2020 was maintained at almost the same level as in 2019, with a growth of 0.1%. In the activity of cutting and processing wood, a decrease of 8.2% was registered, while in the production of wood, cork, wicker and straw products, a growth of 0.9% was registered. In the activity of furniture production in 2020, the growth of production was 6.8%.
96. According to data submitted within the framework of the FRA 2020 reporting, the Serbian forestry sector employed in 2015 in total 9,090 persons and, thus, provided livelihood for mainly rural people and their families. 7,270 persons were engaged in silviculture and other forestry activities², 910 in logging operations, 450 in gathering of non-wood forest products (NWFP) and 460 in

² This class includes: - growing of standing timber: planting, replanting, transplanting, thinning and conserving of forests and timber tracts - growing of coppice, pulpwood and firewood - operation of forest tree nurseries These activities can be carried out in natural or planted forests. Source: <https://unstats.un.org/unsd/classifications/Econ/Detail/EN/27/0210>

support services to forestry³. The share of women employees was around 16% (1,450 women) [5].

97. According to the Development Agency of Serbia (RAS) which is a government organisation offering a wide range of services (support to direct investments, export promotion, etc.) aiming to improve Serbia's attractiveness and reputation and increase economic and regional development, the forest sector is the main source of raw materials for the export-oriented wood industry. The wood industry, together with the forest sector, employs about 53,000 people, achieving export values of over 1.2 billion euros and with a potential for further increase [6].
98. The main products of forest-based industry can be divided into those from state sector, and those from private sector. Activities from state sector can be divided into products from forest management, nursery production, management of hunting grounds, management of fishing areas, and management of protected areas. In addition to this, the main products of the private sector are products from forest management, nursery production and management of hunting grounds.
99. According to the data of the Statistical office of the Republic of Serbia, the number of employees in forestry companies in the Republic of Serbia in 2019, was 4,903 employees, which is 1.8% higher than in 2018. According to the different activities in forestry, the total number of employees can be divided into the following categories:
 - a) Establishing of new forests and forest tending – 1460 employees;
 - b) Utilization of forests – 1879 employees;
 - c) Other activities related to forestry – 1564 employees.
100. Referring to the calculations of the Chamber of Commerce and Industry of Serbia, that are based on the data of the Business Registers Agency, as presented in the Table 7, in 2019, the total of 3,731 companies operated in the forestry and logging, wood processing, furniture and paper industries, which accounts for 2.9% of the total registered companies in the Republic of Serbia. Out of that number, the majority of these companies are registered for the manufacture of wood and of products of wood and cork; except furniture; manufacture of articles of straw and plaiting materials (49.3%). Substantially lower number of companies operated in the manufacture of furniture (24.8%) and in the manufacture of paper and paper products (20.3%). The lowest number of active companies is in the forestry and logging (5.6%).

| Active companies and active entrepreneurs | Active companies | | Active entrepreneurs | |
|--------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------------|----------------------|---------------------------|
| | number | year-to-year change, in % | number | year-to-year change, in % |
| Republic of Serbia | 129,739 | -12.2 | 271,023 | 5.4 |
| Forestry and logging | 209 | -12.2 | 1,254 | 5.8 |
| Manufacture of wood and of products of wood and cork, except furniture; manufacture of article of straw and plaiting materials | 1,841 | -19.3 | 3,708 | 3.4 |
| Manufacture of paper and paper products | 756 | -15.9 | 850 | 3.4 |
| Manufacture of furniture | 925 | -13.5 | 1,729 | 5.4 |
| TOTAL | 3,731 | -16.9 | 7,541 | 4.2 |

Table 7 Active companies and entrepreneurs engaged in forestry operations, wood processing, furniture manufacturing and paper industries in 2019 (Source: internal data of the Chamber of Commerce and Industry of Serbia, 2020)

101. In addition to this, data published by Chamber of Commerce and Industry of Serbia shows that about 95.0% of the registered companies employ less than 50 workers, and only 5.0% account for

³ This class includes carrying out part of the forestry operation on a fee or contract basis. This class includes: - forestry service activities: * forestry inventories * forest management consulting services * timber evaluation * forest fire fighting and protection * forest pest control - logging service activities: * transport of logs within the forest. Source: <https://unstats.un.org/unsd/classifications/Econ/Detail/EN/27/0240>

the companies with more than 50 employees, which shows that these are mainly micro and small companies. In addition to companies, in 2019, about 7,541 entrepreneurs were engaged in the wood processing, furniture and paper industries. More than 90% of enterprises are privately owned and mainly are located in the central areas of Serbia. The majority of these companies deal in timber and wood products, while the rest are engaged in furniture production.

6) State Support to the Sector

102. In the middle of the 20th century, significant efforts in afforestation of bare lands began in the entire territory of the former Yugoslavia to address the issue of overexploitation and related further deterioration in the condition of forest lands, From 1946 to 2006 the State supported the establishment of new forests on an average annual area of 9,006 ha, with a range of annual afforestation of 19,569 ha (1981 to 1985) to only 1,056 ha during the period of 2001 to 2006. In total 540,368 ha were afforested with the primary objective to halt or prevent erosion processes that had devastated large areas after deforestation and forest degradation took place in many areas, but also with the aim to increase the overall forest cover.
103. The establishment of the Budget Fund for Forests (BFF) by the Government of the Republic of Serbia in its current form in 2010 allowed a resumption of forestry-related investments including afforestation. In the period 2015-2019 the average area of newly established forests was around 830 ha annually, but with a declining trend with 992 hectares in 2015 to 614 hectares in 2019. The annual area of forest restoration interventions support by the BFF, namely planting on bare lands, on lands of soil amelioration, on areas after sanitation harvesting and limited afforestation on private lands (by providing seedlings to forest owners) was around 1,300 ha during the period 2015-2019.

| Year | Afforestation - establishing new forests (ha) | Restoration interventions on bare lands, lands of soil amelioration, after sanitation harvesting and afforestation on private lands (ha) |
|--------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 2015 | 991,86 | 1.257,46 |
| 2016 | 956,16 | 1.582,5 |
| 2017 | 858,02 | 1.513,25 |
| 2018 | 731,42 | 1.029,46 |
| 2019 | 613,72 | 1.245,65 |
| TOTAL | 4.151,18 | 6.628,32 |

Table 8 Afforestation and Restoration investments supported by the BFF in Central Serbia during the period 2015-2019 (Source: internal data of the Directorate of Forests, 2020)

104. The AP of Vojvodina has a regional BFF administered by the Provincial Secretariat for Agriculture, Water Management and Forestry. The type of forestry investments supported by the regional BFF in Vojvodina during 2016-2021 and the earmarked funds for 2022 are listed in the table below.

| | 2016 [Mio RSD] | 2017 [Mio RSD] | 2018 [Mio RSD] | 2019 [Mio RSD] | 2020 [Mio RSD] | 2021 [Mio RSD] | 2022 [Mio RSD] | total for period 2016-2022 |
|-----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------------------|
| Purpose | 187.0 | 143.0 | 135.1 | 153.0 | 129.0 | 151.0 | 155.0 | 1,053.1 |
| Afforestation on state-owned land | 54.0 | 54.0 | 25.1 | 20.0 | 20.0 | 50.0 | 60.0 | 283.1 |

| | | | | | | | | |
|----------------------------------------------------|------|------|-------|-------|------|------|------|-------|
| Afforestation on land owned by private land owners | 4.0 | | | | | | | 4.0 |
| Afforestation on land owned by legal entities | 4.0 | | | | | | | 4.0 |
| Forest Melioration | 25.0 | | | | | 25.0 | 35.0 | 85.0 |
| Construction of forest roads | 90.0 | 80.0 | 100.0 | 115.0 | 81.0 | 48.0 | 20.0 | 534.0 |
| Improving nursery production | 10.0 | 5.0 | 10.0 | 18.0 | 20.0 | 28.0 | 40.0 | 131.0 |
| Scientific research | | 4.0 | | | | | | 4.0 |
| Forest seed production | | | | | 8.0 | | | 8.0 |

Table 9 Afforestation and other forestry investments supported by the BFF of AP Vojvodina during the period 2016-2022 (Source: internal data of the Directorate of Forests, 2022)

105. In addition, the Provincial Secretariat for Urbanism and Environmental Protection as well as the Provincial Secretariat for Regional Development, Interregional Cooperation and Local Government provide support to projects in the sphere of environment which may also touch in one way or another on forestry-related issues, a list of which can be found in Annex 1.
106. Further direct or indirect support to the forest sector in AP Vojvodina is provided through the Provincial Secretariat for Finance through co-financing projects financed from EU-funds. A complete list of the co-financing projects supported by the Provincial Secretariat for Finance in 2021 is provided in Annex 2.

7) Past and Ongoing Development Projects / Programmes (table)

| Project / programme | Brief description | Time period | Implementing agency / Funding source / National Partner(s) | Links |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| National Capacity Self-Assessment (NCSA) for Global Environment Management <i>GEF Project ID 2211</i> | | Completed 2004 - 2012 | UNDP / GEF-3 / Ministry for Protection of Natural Resources and the Environment in the Republic of Serbia; Ministry of Environment and Physical Planning in the Republic of Montenegro | https://www.thegef.org/projects-operations/projects/2211 |
| National Capacity Self-Assessment for the Environmental Protection Management in Serbia | During the 1990s, international community became aware of the need to protect global environment. To this end, there was a need to implement effectively the UN Framework Convention on Climate Change (UNFCCC), Convention on Biodiversity (CBD) and Convention to Combat Desertification (CCD). In order to assess the countries' needs regarding capacities and to plan strategies to realize those needs, an agreement was reached between the GEF Secretariat and United Nations Development Programme. Capacity Development Initiative (CDI) was promulgated in May, in 1999. As the first step in CDI implementation it was approved to finance the countries which wanted to implement national capacity self-assessment (NCSA) for the environmental protection management. At the request of the Ministry competent for Environment, the GEF approved in 2003 the means for the realization of the project "National Capacity Self-Assessment for the Environmental Protection Management in Serbia" and the | Completed 2005 – 2010 (Might be the same as the previous project) | UNDP / GEF- / Ministry of Environment, Mining and Spatial planning | https://www.rs.unep.org/content/serbia/en/home/library/environment_energynational-capacity-self-assessment-for-environmental-protection-m.html |

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|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | project started in 2005. Finalization of the project “National Capacity Self-Assessment for the Environmental Protection Management in Serbia” is again initialized by the Ministry of Environment, Mining and Spatial planning in 2010 and financed by GEF. | | | |
| Dinaric Arc Parks | <p>WWF started the project Dinaric Arc Parks in early 2012, with the aim to create an association of nature and national parks in the territory of Albania, Bosnia and Herzegovina, Croatia, Kosovo*, North Macedonia, Montenegro, Serbia and Slovenia. This three-year project was funded by the Norwegian Ministry of Foreign Affairs and the MAVA Foundation. The first and main objective of this project was to create a network of protected areas by connecting all parks in the Dinaric Arc region.</p> <p><i>*) “All references to Kosovo should be understood to be in the context of United Nations Security Council resolution 1244 (1999).”</i></p> | Completed 2012-2015 | WWF / Norway / | http://awsassets.panda.org/downloads/fs2012_dinaric_arc_parks_web_1.pdf http://awsassets.panda.org/downloads/fs2012_dinaric_arc_parks_web_1.pdf |
| Development of a sustainable bioenergy market in Serbia | <p>The objective of this project was to improve the general conditions, expertise and resources required to promote the sustainable use of bioenergy; this contributed also to rural development and to greenhouse gas mitigation. The programme advised ministries and authorities on eliminating regulatory barriers and on adapting to EU-compliant regulations on the sustainable use of biomass. Training courses and networking events helped to improve the expertise of political decision-makers. Cooperation agreements for developing sustainable biomass supply chains have been concluded with 13 district heating companies. The recommendations on cost-efficient use of fuelwood and energy-saving stoves have reached more than 7,500 households since the awareness-raising campaign was launched. These recommendations can help to reduce air pollution in living quarters and conserve forest resources.</p> <p>Evaluation of Phase I: https://star-www.giz.de/cgi-bin/getfile/53616c7465645f5f499220ada790771deea8a11f7612bc </p> | Completed Phase I 2013 – 2017 Phase II 2018 – 2020 | GIZ / German Federal Ministry for Economic Cooperation and Development (BMZ)/European Union / Ministry of Agriculture and Environmental Protection | https://www.giz.de/en/worldwide/26153.html http://www.bioenergy-serbia.rs/index.php/en/ |

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| | 8c0d2ca136356258b3360302f7eb2e384c0c21dda938a3cedfee4098a6e03ffe80ae48bc80a5331034/giz2020-0100en-projectevaluation-bioenergy-market-serbia-pev.pdf | | | |
| Reducing Barriers to Accelerate the Development of Biomass Markets in Serbia | <p>The project aims to reduce barriers to accelerate the development of biomass markets in Serbia. The objective of the Biomass Project is to increase the share of energy from renewable sources in the energy mix of Serbia, namely the share of biomass in power generation.</p> <p>The Project started in 2014. With US\$ 3.1 million from the GEF and UNDP, the Biomass Project will have a total budget of US\$ 30 million. Co-financing will be provided by Serbian institutions and private investors</p> | Completed 01 October 2013 - 31 December 2019 | <p>UNDP / GEF- / Ministry of Mining and Energy;</p> <p>Ministry of Agriculture and Environmental Protection</p> | <p>https://www.rs.undp.org/content/serbia/en/home/projects/reducing-barriers-to-accelerate-the-development-of-biomass-market-serbia-pev.pdf</p> <p>https://open.undp.org/projects/00074238</p> |
| Innovative Forest Management Planning | This project was implemented in order to reinforce and strengthen forest functions and services. There was the need to develop an improved planning and monitoring methodology for Serbia's forest management. This methodology pronounced close-to-nature forest management as a guiding principle. | Completed 2015 – 2017 | <p>Unique land use GmbH in consortium with Hessen-Forst / Bundesministerium für Ernährung und Landwirtschaft (BMEL) of Germany.</p> <p>Ministry of Agriculture and Environment.</p> | https://www.unique-landuse.de/en/projects/1540-innovative-forest-management-planning/ |
| Vocational and Postgraduate Training in the Forestry Sector | In a first cooperation between the Serbian Ministry of Agriculture, Forestry and Water Management and the BMEL in 2014, several challenges for the Serbian forestry sector were identified. Due to political changes in the region, the Serbian forestry sector required updating to facilitate the implementation of modern forest management. This second cooperation project addresses the lack of practical orientation in vocational training and the missing practical postgraduate training programs. UNIQUE and | Completed 2017 - 2019 | <p>Unique land use GmbH and HessenForst / Bundesministerium für Ernährung und Landwirtschaft (BMEL) of Germany /</p> | https://www.unique-landuse.de/en/projects/1762-vocational-and-postgraduate-training-in-the-forestry-sector/ |

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| | HessenForst supported the Serbian forestry sector in implementing the previously developed and improved forest management planning and monitoring methodology for vocational training and practical training. | | MAFWM | |
| Enhanced Cross-Sectoral Land Management through Land Use Pressure Reduction and Planning <i>GEF Project ID 5822</i> | The objective of this project was the development of instruments and mechanisms for integrated land use management, remediation, and capacity development to reduce pressures on land as a natural resource from competing land uses in the wider landscape and to support reversal of land degradation. | Completed 7 October 2015 - 30 September 2021 | UNEP / GEF-5/UNEP/Serbia / Ministry of Energy, Development and Environmental Protection | https://www.thegef.org/projects-operations/projects/5822 |
| GEF Support to UNCCD 2018 national reporting process – Umbrella II – Serbia <i>GEF Project ID 9980</i> | The Project Objective is to enable country Parties to collect necessary biophysical, socioeconomic data, establish sound reporting and monitoring systems at national level and report against the UNCCD Strategy. | Probably completed by now Approved in 2018 | UNEP / GEF - 6 / Ministry of Agriculture and Environmental Protection (in Serbia + different ministries in other beneficiary countries) | https://www.thegef.org/projects-operations/projects/9980 |
| Prevent The Effects Of Urban Disasters In South East European Countries | Severe floods (2014-2015) that struck South East European (SEE) countries have once again confirmed that disasters do not know of any borders and that disasters are often “shared”. The expected outcome of the project was to enable South East European countries to reduce the likelihood of conflict and to lower the risk of natural disasters, including from climate change. | Completed 1 Jan 2017 – 31 Dec 2019 | UNDP / UNDP/European Civil Protection & Humanitarian Aid Operations / ?? | https://open.undp.org/projects/00100674 |

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| Enhancing Access To Climate Finance In The ECIS Region | <p>The main objective of this project was to enhance access to climate finance and to support knowledge exchange across the country on leveraging and management of the climate finance in the Republic of Serbia. The project was funded by UNDP Russia Trust Fund and it was part of a regional project Enhancing Access to Climate Finance in the ECIS region.</p> <p>The project was focusing on climate finance access and project's activities were clustered into two components:</p> <ul style="list-style-type: none"> - Support to feasibility analysis, economic and cost benefit analysis, project scoping and design aimed at leveraging new and additional climate finance investments in the country; - Exchange knowledge across the ECIS countries on leveraging and management of the climate finance. | Completed 1 Jan 2017 – 31 Dec 2021 | UNDP / Russia / ?? | https://open.undp.org/projects/00104887 https://info.undp.org/docs/pdc/Documents/SVK/104887_ProDoc_Climate-Finance_signed.pdf |
| Capacity Development for Improved Implementation of Multilateral Environmental Agreements | <p>The objective of the project is to improve implementation of MEAs in Serbia by strengthening consultative processes and integrating MEA provisions into high-priority policies and programs at national and municipal levels. The project will strengthen participation in MEAs through targeted research, a comprehensive overview of MEA issues and activities, and ongoing input from civil society. It will also enable national and local government units to include global environmental considerations in selected reports and strategies. Finally, it will develop capacity in key target groups (Members of Parliament, youth, and university and mid-career students) to understand and participate in activities that benefit the global environment.</p> | Completed 1 Jan 2017 – 31 Dec 2021 | UNDP / GEF/UNDP / Ministry of Agriculture and Environmental Protection | https://open.undp.org/projects/00087663 |
| Third National Communication UNFCCC | <p>The project aims to enabling the Republic of Serbia to prepare, produce and disseminate its 2nd Biennial Update Report and 3rd National Communication to the UN Convention on Climate Change. These will update and strengthen information provided regarding national circumstances, GHG inventories, climate change mitigation, vulnerability to climate change, and steps taken to adapt to climate change, as well as identify gaps, constraints, and financial, technological and capacity building needs.</p> | Completed 1 June 2017 – 12 Jan 2022 | UNDP / GEF / Ministry of Environmental Protection | https://open.undp.org/projects/00099636 |

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| "Climate Pact for Impact" | The project "Climate Pact for Impact" has been designed to connect various parts of society, sectors, knowledge platforms and know-hows. This project was focusing on education, raising public awareness and capacity building about climate change, and the importance of considering both mitigation and adaptation in decision-making for the long-term sustainable development of the society. Key issue to address was to increase understanding and enable the public to participate in initiatives and activities aimed at adapting to climate change. | Completed November 2019 – December 2021 | WWF / Sweden / ? | https://www.wwf.org/what_we_do/all_initiatives/climate_pact_for_impact/ |
| Building Resilience of Agricultural Sector to Natural Disasters and Climate Change Impacts TCP/SRB/3705 | Capacities of local governments for management of natural disasters and implementation of resilient prevention and recovery measures were strengthened, and manuals and training material developed in of advisory in DRR/CSA approach and practice. | Completed 01-Jan-2020 - 31-Dec-2021 | FAO / FAO TCP / MAFWM; Public Investment Management Office | |
| Protected Areas for Nature and People I and II | "Protected Areas for Nature and People II" is a regional project to be implemented from 2019 to 2022 in Serbia, Bosnia and Herzegovina, Albania, Montenegro, Northern Macedonia, and Kosovo*. It is a continuation of the project under the same name that lasted from 2016 till 2019. The goal of the project is the efficient and financially sustainable management of protected areas, through improving national policies for Protected Area management and biodiversity conservation and increasing the participation of local communities in the management of protected areas. *) "All references to Kosovo should be understood to be in the context of United Nations Security Council resolution 1244 (1999)." | Phase I completed 2016 - 2019 Phase II ongoing 2019 - 2022 | WWF / SIDA / ? | https://www.wwf.org/what_we_do/all_initiatives/protected_areas_for_nature_and_people/ |
| Contribution of Sustainable Forest Management to a Low Emission and Resilient Development | The project will address the four barriers of mainstreaming a sustainable forest management in Serbia to contribute to the conservation of biodiversity and climate change mitigation through the promotion of multifunctional sustainable forest management in productive forest landscapes. | Ongoing 19-Feb-2018 - 30-Jun-2023 | FAO / GEF-6 / | https://www.thegef.org/projects-operations/projects/9089 |

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| GCP/SRB/002/GFF / GEF Project ID 9089 | | | MAFWM - Directorate of Forests | |
| Adaptation Planning Serbia NAP | Climate change impacts threaten Serbia's development, particularly agriculture and water management, forestry, energy, transport and infrastructure sectors. In line with the UNFCCC, Paris Agreement for Climate Change, and within the EU accession progress, Serbia has committed to adapt to changing climate conditions. Serbia has made much progress in establishing an effective institutional and legal framework to combat climate change, though significant gaps and needs remain. These include insufficient information flow among relevant institutions, as well as uncoordinated and ad hoc planning and lack of funding for further integration of climate change adaptation measures into strategies and policies on national and subnational level. The goal of this project is to improve Serbia's legal framework for addressing climate change vulnerabilities and strengthen institutional capacities for integrating climate change adaptation (CCA) measures into decision making and investment planning. | Ongoing Sept 2018 – Jan 2023 | UNDP / GCF / ? | https://www.rs.undp.org/content/serbia/en/home/projects/adaptation-planning-serbia-nap.html https://open.undp.org/projects/00105424 |
| Establishing Transparency Framework for the Republic of Serbia | The project will finalize and launch a monitoring, reporting, and verification (MRV) system that will allow Serbia to define and implement climate change-related policies and measures as expressed in its Nationally Determined Contribution (NDC) effectively and will allow the country to undertake more ambitious commitments in its NDCs over time. | Ongoing March 2019 – June 2022 | UNDP / UNDP/GEF/Austria / Ministry of Environmental Protection | https://www.rs.undp.org/content/serbia/en/home/projects/establishing-transparency-framework-for-the-republic-of-serbia.html |
| ANKLIWA-DS Adaptive forest management – Germany – Serbia | This project aims to find adaptive and sustainable management strategies to climate change for the forests in Serbia. This project will also be a testbed for German forests to develop sustainable forest management strategies under climate change because future climate conditions may be similar to the comparatively drier climate found currently in Serbia. The innovative forest planning approach is based on sound scientific findings encompassing site- | Ongoing 1 November 2019 - 31 October 2022 | UNIQUE and University of Freiburg / Bundesministerium für Ernährung und Landwirtschaft (BMEL) of Germany | https://www.researchgate.net/project/ANKLIWA-DS-bilateral-cooperation-between-Serbia-and-Germany-to-develop-and- |

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| | specific mapping, climate sensitive forest growth simulations, evaluation of the suitability of tree species and their productivity under climate change and development of policy strategies for adaptation measures. | | / MAFWM | implement-adaptation-strategies-to-climate-change-in-forest-management |
| FEM4FOREST Forests in Women's hands | The main objective of this project is to strengthen the forest sector at local, regional and interregional level through increased involvement and ability of women actors by supporting their equal presence and competences at the market in Danube Region. The overall Project concept follows an interactive innovation model where innovation occurs as a result of multi-actor interactions driven by needs of society and market, state of the art of science and technology, and organizational capabilities. The planned activities are demand-driven and target three most crucial components: social inclusion, gender equality and economic independency. Project started in July 2020, and is envisaged to finish at December 2022. Project is financed through Danube Transnational Programme. | Ongoing 1 July 2020 - 31 December 2022 | Slovenian Forestry Institute and others / Donor: Interreg Danube Transnational Programme / MAFWM – Directorate of Forests | Project website: https://www.interreg-danube.eu/approve-projects/fem4forest Project reports: https://www.interreg-danube.eu/approve-projects/fem4forest/outputs |
| Strengthening Serbia's AFOLU sector capacities to access climate finance for priority investments <i>GCP/SRB/004/GCR</i> | This project is focusing on increasing national capacities to accelerate climate related investments, with focus on engagement of private sector. The project works on strengthening Serbia's capacities to access climate finance for climate investments, with the objectives to: a) raise awareness in the public; b) engage with private sector and facilitate direct access to the climate investments; c) implement priority investments in the forest energy, agriculture, water resources, and hydrology sectors. | Ongoing 14-Oct-2020 - 14-Sep-2022 | FAO / GCF (Readiness and Preparatory Support) / MAFWM | |
| Twinning project: Improvement of forest management in Serbia as a contribution to climate | The overall objective of this project is to improve forest governance in Serbia in line with EU standards and requirements and to introduce comprehensive sectoral policy to ensure the reduction of illegal activities and resilience of forests to climate change. Specific | Ongoing 11 January 2021 – January 2023 | Twinning Project Consortium of Austria and Slovakia (Austrian Research Centre for | http://www.twinplace.eu/MyTwinPlace/Members/InterestDetails.aspx?3846 |

| | | | | |
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| change adaptation and mitigation | <p>objective is to strengthen capacities of forestry sector in Serbia to be able to implement obligations stemming from EU standards and regulations in the field of forestry and forestry related fields, including timber market, Forest Information System, subsidies, NATURA 2000 and bio economy. The project will contribute to climate change adaptation and mitigation in forestry, entirely in accordance with the European Green Deal. This Twinning Project is aligned with and fully supports the Government of Serbia's strategic target to provide the regulatory, institutional, and economic frameworks for the implementation of sustainable forest management. The two-year EU-funded Twinning project "Improvement of forest management in Serbia as a contribution to climate change adaptation and mitigation" was launched on 11 January 2021.</p> | | <p>Forests and Austrian Federal Forest Office (BFW), the Federal Ministry of Agriculture, Regions and Tourism, Austria (BMLRT), the Austrian Federal Forests (Österreichische Bundesforste AG, ÖBF), the Environment Agency Austria (EAA), the Ministry of Agriculture and Rural Development of the Republic of Slovakia (MARD) and the National Forest Centre (Národné lesnícke centrum, NLC) / EU / MAFWM – Directorate of Forests</p> | <p>https://eu-for-forests-in-serbia.euzatebe.rs/en/about-project</p> |
| Forest Resilience to CC and BD loss via mitigation and adaptation investments <i>TCP/SRB/3801/C1</i> | <p>This project will undertake pre-feasibility studies in relation to the climate change adaptation and mitigation potential of the forestry sector, based on which a Project Identification Note (PIN) will be prepared to decide together with Serbian counterparts on the development of a Concept Note and eventual fully-fledged project to be submitted to the GCF. Additionally, the project will support the discussions with national and sub-regional administration to contribute to and achieve a strong commitment to supporting a future climate change adaptation and mitigation intervention in the forestry sector of Serbia.</p> | <p>Ongoing 01-Apr-2021 - 30-Apr-2022</p> | <p>FAO / FAO TCP / MAFWM</p> | |

| | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Support to organic agriculture <i>TCP/SRB/3804</i> | <p>The TCP will support the development of the organic sector in Serbia, by focusing on strengthening the policy session to support the compliance of the national legislation with the EU acquis, including the road map for alignment of the organic legislation with the EU standards and procedures and support the underdeveloped organic livestock subsector.</p> | Ongoing 01-Oct-2021 - 30-Sep-2023 | FAO / FAO TCP / MAFWM | |
| Enabling environment at policy, field and market levels for Forest Landscape Restoration (FLR) to achieve Land Degradation Neutrality (LDN) in Serbia (MSP) <i>GCP/SRB/007/GFF</i> | <p>The project objective is to promote FLR and LDN practices for the recovery and restoration of prioritized landscapes that sustain environmental services and food security and to establish support mechanisms for achieving and monitoring LDN at the national level. This project also prepares the ground for an envisaged GCF initiative that will upscale successful FLR practices and contribute to the government's UNCCD commitment to increase forest cover to 41% of in Serbia's national territory (LDN target) by 2050. Through its three components, the project will promote a scenario for wide adoption of FLR strategies and practices in priority intervention landscapes, applying the LDN hierarchy avoid - reduce - recover. Project has been approved and financed by GEF Trust Fund, and its implementation will start in early 2022.</p> | Ongoing 01-Nov-2021 - 31-Oct-2024 | FAO / GEF-7 / MAFWM | https://www.thegef.org/projects-operations/projects/10814 |

8) Lessons Learned and Good Practices

107. Forests and forestry have become more prominent in the context of climate change mitigation and adaptation, and the pressure of society to change from a Business As Usual (BAU) forest management to a new sustainable, climate adaptive approach is on the increase. Close-to-nature forest management, which takes into account the multi-functionality of forests, has become the guiding principle of the Serbian forestry sector. Incorporating Climate Adaptive Silviculture (CAS) into forest management will further contribute to realise the full potential of forests to contribute to climate change adaptation and mitigation in the country.
108. After the big floods in 2014 and ice-break damages in early 2015, Serbia started revising the concept of forest management. Projects funded by German Ministry of Agriculture and Tourism, as well as the ongoing forestry project funded by GEF-6 provided the forestry sector with state-of-the-art guidelines for the management of the most important tree species and common forest types in Serbia. In addition, the GEF funded project will provide the forestry sector with Forest Information System (FIS) as a main tool for evidence based decision making on forest-related matters.
109. In order to meet the target of 41.4% of forest cover in Serbia by 2050, new areas for afforestation are to be identified, preferably on degraded agricultural lands and land of lower cadastral classes. Afforestation as integral part of landscape restoration is not only important in the context of climate change adaptation and mitigation and disaster risk reduction, but also as the most effective measure in controlling land degradation. Selection of the most suited species and the appropriate planting techniques for every individual site for afforestation and its purpose, are key for success of FLR investments, both in ecological and economic terms.
110. The traditional way of forest management in Serbia is challenged by new and growing demands from society, manifested by increased awareness on the different functions, such as prevention of land degradation, protection of biodiversity and wilderness, but also the increasing use of forests for recreation purposes, human health and collection of non-wood forest products.
111. Availability of wood biomass at national level for replacing fossil fuels in local district and individual heating systems and creation of sustainable bioenergy market was the subject of GIZ implemented projects in the last decade. Good practices in relation to the replacement of fossil fuel boilers with biomass boilers that use wood chips are applied in two locations in Serbia (Priboj and Mali Zvornik), mostly for heating of public institution buildings and education facilities. It is important that the energy sector is timely informed about the objectives of the Country's forest strategy and policy, to see the real potential for wood biomass supply in relation to the strategic goals of the energy sector, and to better define the target parameters for the installation of CHP plants.
112. By signing the Sofia Declaration on the Green Agenda for the Western Balkans in November 2020, Serbia has committed to a number of actions like introducing carbon pricing instruments and market-based renewables support schemes, as well as phasing out coal subsidies. The Declaration will have impacts on the forest sector in the areas of climate change and pollution prevention, energy development, circular economy, biodiversity development and sustainable agriculture.
113. Although it is important to approach complex, multifaceted issues such as forest and land degradation in a holistic manner, the scope of a project and areas of interventions should match available funds to prevent fragmentation of activities. Project designers tend to include as many potentially relevant elements as possible, which limits the success at prioritizing and focusing activities, as well as strain limited local implementation capacities.

9) SWOT Analysis of the Sector

| Strength | Weaknesses |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ➤ Recognition of importance of forest goods, services on national, local and public level ➤ Long forestry tradition ➤ Existing core budget (Forest fund) for forestry investments ➤ Stable/growing market for wood and NWFP ➤ Highly productive and accessible alluvial forests (in Vojvodina) ➤ Qualified professional staff sufficient in number in forestry enterprises ➤ Rich biodiversity still existing in forests of Serbia | <ul style="list-style-type: none"> ➤ Forestry Development Strategy (2006) is outdated, Forest Development Program (2011) not adopted and partly outdated ➤ FMP plans not fully implemented in relation to silvicultural investments ➤ Outdated business set-up of PEs ➤ Significant areas of public forests with unclear borders ➤ Missing of basic data on private forests, but vast majority of private forest owners having very small parcels ➤ Huge number of passive forest owners living in cities or abroad ➤ Limited knowledge on climate change impacts and biodiversity aspects in forestry-related curricula ➤ Inadequate cross sectoral coordination and cooperation in forestry-related matters, in particular information sharing on project activities of various stakeholders ➤ Inadequate level of applied research in forestry |
| Opportunities | Threats |
| <ul style="list-style-type: none"> ➤ Forestry recognized as key sector for CC mitigation and adaptation, as well as green economy ➤ Significant potential to increase resilience as well as productivity of forests (e.g. conversion of coppice forests) ➤ Forest Information System (FIS) to enable informed decision making in the sector ➤ Postgraduate learning system through recently established Chamber of Forestry Engineers ➤ Increased knowledge and awareness of the public on the importance of forests and their multi-functional roles ➤ New forest development and management planning system (designed by GEF6) taking account of biodiversity and CC ➤ High public awareness (especially Vojvodina) of the importance of conservation, improved management and increasing the forested area | <ul style="list-style-type: none"> ➤ Predicted climate change and extreme climate-related weather events ➤ Changes in main species composition as well as emergence of invasive species due to climate change ➤ Reduced productivity, resilience and capacity for natural regeneration of forest stands due to climate change ➤ Non-availability (missing) of operators/skilled work force in forestry ➤ Inadequate forest fire intervention capacities and investments ➤ Increasing pressure on forest lands due to construction activities (infrastructure and urban development) ➤ Monopolistic position of PEs for forest management and timber trading |

10) *Proposed interventions and Recommendations*

10.1 *Rationale and Detailed Description of Proposed Interventions*

114. The climate and climate change analysis [20] of local meteorological data shows that Climate Change has already impacted Serbia. Both annual average temperature and annual maximum temperature are showing significant increasing trends in the 1960-2020 period (average temperature + 0.3 °C per decade and maximum temperature +0.5°C per decade) [Annex 1]. Higher trends of increase were observed in altitudes above 1000 m and during the summer months (June, July and August) [21] [22] [TCN, 2020]. Heat waves increased by 20 days in the period 2008-2017 and up to 30 days in lowlands and western parts, and extreme heat waves by 2-3 days per year [TCN, 2020]. The analysis of wind speeds in key productive areas for agriculture [Annex 1] such as Vojvodina (annual average wind speed of 28 km/h, with gusts up to 250 km/h for the period 1980 – 2020) suggests that winds will act as magnifier of these impacts.
115. Climate projections indicate that mean temperatures (MIN-MAX) are expected to increase by +0.5°C (RCP 4.5) and +1°C (RCP8.5) in the 2016-2035 period, and by 1.5°C (RCP 4.5) and + 2 °C (RCP 8.5) in the 2046-2065 period [TCN, 2020]. Warming will be higher in July-August (up to +4.7°C) and during the whole fall (1986-2005 reference period) [22]. Precipitations are projected to remain stable around 720 mm a year, with a very large continued year to year variation range, from 400 mm to 1000 mm [Annex 1]. Summer days (number of days with a temperature above 25°C) will be continuously increasing reaching additional 15 days in the 2016-2035 period and +30 days by the end of the century [TCN, 2020] [20]. These trends will be more pronounced in lower altitudes, especially in Vojvodina and Central Serbia. Extreme heat waves could occur at least 2-3 times a year compared to the 1986-2005 period (considered as rare events) [22], while frost and ice days will continue decreasing, especially at higher altitudes under both scenarios, and precipitations are expected to decrease by -20% in the far future (2050-2100) [UNDP, 2019] [20].
116. Climate change will have serious impacts on Serbian forest ecosystems and the forestry sector's performance due to the multiple effects and complex interaction of predicted stress factors such as precipitation deficit, droughts, increased temperatures, extreme weather events (e.g. storms), fires, pest outbreaks and diseases [23] [21] [TCN, 2020]. Whether there will be a reduction in rainfall or not, higher annual temperatures and the increased periods of drought and heat waves in the summer period will result in higher evapotranspiration, which may have major impacts on the growth, health conditions and survival of many tree species. Unhealthy trees and forest stands will become more sensitive to pests and diseases.
117. For example, research carried out in Armenia has demonstrated a positive correlation between mean temperature in summer and affected area by Browntail Moth (*Euproctis chrysorrhoea*) that cause major problems to oak forests [24] (Figure 2).
118. *Euproctis chrysorrhoea* is common throughout Europe and North Africa, from southern Sweden and southeastern England to southern Russia. In the Anatolian Region of Türkiye *Euproctis chrysorrhoea* caused great damage to fruit trees with population outbreaks at intervals of 8-10 years before 1990 [25]. In a recent study, however, *Euproctis chrysorrhoea* has been found in Bingöl region of Türkiye for the last four years in a row (between 2018 and 2021) rather than showing a cyclical manner, suggesting that the effect of climatic changes in recent years is significant [26].

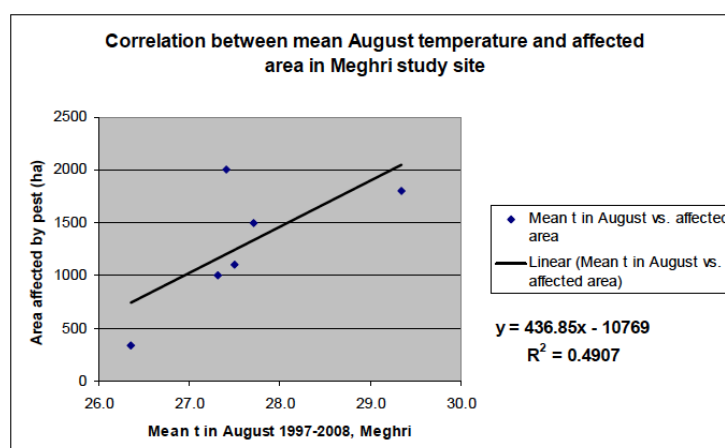


Figure 2 Correlation between temperature and area affected by pest [24]

119. Research work on *Euproctis chrysorrhoea* as well as other five lepidopteran species exhibiting outbreak dynamics in the neighbouring country of Hungary (*Thaumetopoea processionea*, *Tortrix viridana*, *Rhyacionia buoliana*, *Malacosoma neustria* and *Lymantria dispar*), established for two species a clear long-term trend of increased damage due to climatic changes. It was concluded that species exhibiting a trend toward outbreak-level damage over a greater geographical area may be positively affected by changes in weather conditions coinciding with important life stages [27], however further studies would help to increase understanding of responses of forest insects to climate change.
120. Forest pests and diseases, in particular alien pests - such as the Browntail Moth that was introduced in Armenia in the 1940s' - are a major threat to Europe's forests, endangering their current role as important carbon storage to help mitigate climate change. Since human impact is high in forest ecosystems in Serbia, the combined effect of unhealthy forests, pest outbreaks and climate change impacts can compromise the forests' provision of important ecosystem services such as carbon storage in the absence of appropriate adaptation and mitigation interventions.
121. In addition, water stress will weaken and eventually kill trees, thus, leading to an accumulation of dead and dry biomass which will significantly increase the risk of forest fires.
122. Statistics provided by MAFWM show a trend of increasing amounts of sanitation harvest and salvage cuttings in Serbian forests due to pest and diseases, fires and climatic hazards (+268% of m3 of wood lost in the period 1966-2019). Over the last two decades, droughts and fires led to the temporary loss of forest cover (about 2.2%) and forest degradation on over 60,000 ha of forests. Official statistical data also show that the frequency of forest fires as well as the total annual burned area has grown steadily since 1993 affecting mostly conifer species [28]. Based on the presented climatic trends and projections, the adverse impacts of climate change on forests are projected to increase both in frequency and area. This will reduce forest's capacity to provide for carbon removals as well as for ecosystem services (e.g. fuelwood, non-wood forest products, protection) for the people living in rural settlements.
123. Forest's vulnerability is exacerbated by the overexploitation of wood resources at local level and by the high adaptation deficit of the sector. Woody biomass mainly deriving from forests or a combination of wood and other solid fuels for heating is used in 37.1% - or 934.237 - of Serbian households [9], resulting in fuelwood cutting continuing to be the main anthropogenic driver of forest degradation in Serbia.
124. Under the BAU scenario, plant production capacities will remain insufficient for larger scale forest restoration interventions to contribute to Serbia's goal of increasing the forest cover to 41% by 2050. The PE's nursery in Požega has produced 685,000 seedlings in 2021 of a limited number of

tree species (e.g. Pinus sp., Picea sp., Abies sp., Fagus sp., Quercus sp., Populus sp., Salix sp., Acer sp., Juglans sp.), in the form of bare-root (broadleaved trees) and containerised (conifers) seedlings. In addition, the PE's nursery in Barje produced 821,300 seedlings, the vast majority of which is containerised conifers and a few bare-root broadleaved trees.

125. The biggest private nurseries may produce up to 1.3 Mio. Seedlings annually, mainly bare-root broadleaf species. Current planting techniques do not incorporate effective soil preparation and maintenance measures to face water constraints during the critical summer drought periods in the first two years after planting, which results in a limited survival rate - from discussions with staff from PE Serbia Shume, an average of 40% survival rate was indicated, however, the survival rate in private forest might be even somewhat lower. Under this scenario, it will be hard to respond to the Governmental goal of reaching a forest cover of 41% by 2050, or to meet even the more realistic goal to increase the forest area by 5,000 ha annually as stated in the FDP for 2011 - 2020.
126. Under the project scenario, concrete measures will be taken in forest restoration, sustainable management, effective governance and policy improvement to increase the resilience of forest ecosystems and rural communities to climate change impacts and ensure the provision of critical ecosystem services, such as wood and non-wood forest products supporting rural livelihoods, and carbon storage.
127. Under project result 1 the project will enhance the capacity of public and private stakeholders to engage and implement climate adaptive silviculture (CAS) with the aim to stop and reverse degradation drivers – maladaptive practices and overuse of natural resources – and create viable options for the sustainable use of forest resources positively affecting people's livelihoods, particularly in vulnerable rural communities. The establishment of an effective Forest Monitoring as well as Reporting system will support the roll-out of CAS practices throughout the country.
128. Project result 2 will mainly address the forest restoration interventions responding to the Governmental goal to increase forest cover by around 900,000 ha (around 41%) in year 2050 following an ecosystem approach for climate change adaptation and mitigation [\[29\]](#). The project will support the implementation of several forest restoration interventions pursuing both climate change adaption and mitigation objectives: higher resilience to climate risks of existing and restored forests, with higher capacity to store carbon. Forest restoration under project result 2 will include the following interventions for climate change adaptation and mitigation benefits:

| Intervention | Adaptation benefits | Mitigation benefits |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Selection of forest species better adapted to the climate projections, and production of high quality plant material to be used in field planting operations. | The selection of species with higher tolerance to projected climate conditions for 2050-2100 period will increase the resilience to climate risks and pest outbreaks of the planted trees when they will reach maturity. The production of drought-tolerant seedlings through adequate water and nutrient hardening techniques will increase their capacity to survive in the field, especially during the critical two first years after planting. It will also limit the weakening of tree health conditions in case of drought, reducing the risk of phytophagous insects' attacks. | Better adapted species to projected climate conditions and quality seedlings will higher survival rate will increase carbon sequestration capacity in the long-term. Healthier seedlings of drought-tolerant species will be more resilient to climate risks such as drought and heat waves. This will help prevent mortality and weakening of trees due to water stress, and the consequent accumulation of dry biomass that significantly increase fire risk and pest outbreaks. This significantly reduce the risk of carbon loss. |
| Restoration of degraded forest lands through tree planting of a mix of forest | A mix of forest species with different life-form strategies (e.g. re-sprouting species after fire, cutting and browse; | A mix of forest species helps reduce forest loss in planting areas due to human-induced risks, such as fires, |

| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| species adapted to the selected intervention sites. | fruit-trees attracting seed-dispersal fauna; drought-resistant species; nitrogen-fixing species; denuded soil-fixing species), provides a wider range of opportunities to cope with climate-risks, and thus increases forest resilience. Applying effective soil preparation techniques and selecting the best period for planting will increase soil water conditions in critical periods after planting and will improve seedlings survival rate. Adjusting the plant density to climate constraints, mainly the increase of water deficit during summer drought, will help reduce seedlings' mortality. | preventing future losses of carbon storage. Effective planting techniques will increase seedlings survival rate and ensure future carbon storage. A mixed of forest species raise the ecological and socio-economic value of the planting areas, ensuring a wider range of ecosystem services for rural livelihoods, which helps prevent degradation drivers and ensure carbon storage. |
| Restoration of degraded agricultural and abandoned land through tree planting of a mixed of wild fruit-tree species and shrubs with multipurpose environmental and socio-economic objectives. | The planting of multi-purpose wild fruit-tree and shrub species in addition to forest species enhances the ecological and socio-economic resilience of the target areas. Applying effective soil preparation techniques and selecting the best period for planting will increase soil water conditions in critical periods after planting, improving seedlings survival rate. Adjusting the plant density to growing climate constraints will help reduce water stress and seedlings' mortality. | Effective planting techniques will increase seedlings survival rate and ensure future carbon storage. A mix of tree and shrub species will raise the ecological and socio-economic value of the planted areas, providing a wider range of ecosystem services for rural livelihoods, which helps prevent degradation drivers and ensure carbon storage. |

Table 11 Forest restoration through planting interventions for climate change adaptation and mitigation benefits

Adherence with GCF investment Criteria (see annex 3)

129. The activities proposed in this WP have been defined in consultation with the national stakeholders and taking account of all relevant recent studies and reports available on Serbia's climate change impacts and strategies in relation to forestry, and are aligned with the six investment criteria of the GCF.

130. **Investment Criteria 1 - Impact potential:** 9.5 million tonnes of CO₂ of project lifetime emission reductions (mitigation impact) and 500,000 hectares of public natural forests and 18.3 thousand hectares of private forests are under CAS/SFM (adaptation impact).

- *Impact Potential (Mitigation): The project will increase the capacity of public and private forests to remove CO₂, it will reduce the negative impact of drivers of forest degradation, and it will support Serbian companies to decarbonize their processes and increase their resilience. With regards to mitigation impacts, the project used FAO EX-ACT, a tool specifically designed for evaluating the carbon impact of projects in the AFOLU sector that uses IPCC methodology.*
- *Impact Potential (Adaptation): The project will transfer to Serbia the knowledge, technology and climate adaptive silviculture (CAS) practices needed to reduce the climate change and adaptation deficit of public and private forest stakeholders, as well as to enable the forest sector to become more resilient to climate change and contribute effectively and efficiently to the national decarbonization process. The adaptation impact of this proposal on ecosystem and ecosystem services originates from the estimation that every year for 1/10 of the country's total forest area Forest Management Plans (FMPs, obligatory with the Law on Forests (2010))*

will be developed with climate adaptive silviculture practices and executed. This is calculated based on current capacities of forestry institutions and does not include yet the impact on privately owned forests. This will be added in the FP. Concerning the number of beneficiaries, the proposal included those that will participate in the trainings and capacity development programs as well as those that will benefit directly from forests and new forests in terms of disaster risk reduction, improved access to non-wooded products and biodiversity.

131. The project will increase national forest cover by 0.33% (7,500 ha new forest), establish 500 ha of shelterbelts as well as restore at least 51,000 ha of degraded forests (3.5% of the degraded coppice forest area). **Core Indicator: M9.1** Additionally, an indirect positive impact is expected through enhancement of forest carbon stocks on over 59,000 ha via newly introduced climate practices in forest restoration and management. **Core Indicator: M4.1.**
132. BAU management of forests and energy access in rural areas has failed in guaranteeing livelihood, security and natural regeneration of forest's resources. Vast areas of Serbia's forest lands accessible for exploitation are under various stages of degradation due to inefficient management of forest resources, lack of law enforcement as well as lack of stakeholders' participation at all levels (national, regional, community) in relation to forest governance issues. The project will support the shift from a low resilient and climate vulnerable forest exploitation based rural economy to a climate adaptive sustainable forestry enhancing economy where ecosystems constitute the driver of development for rural communities, and the country as a whole.
133. By developing with participation of all relevant stakeholders in Central Serbia and Vojvodina regions "climate-adaptive forest management guidelines", aiming at addressing the key bottlenecks related to climate change mitigation and adaptation in the forestry sector, the project has a high potential for scaling-up and roll-out of CAS practices, in particular since staff from PEs will be directly or indirectly involved in the development and implementation of the guidelines. The project will ensure knowledge transfer through theoretical and on-the-job training, awareness and capacity development for at least 2,500 people from rural communities from all over the country (1,700 from public institutions and enterprises, and 800 private stakeholders). Additionally, the project will establish collaboration and partnerships through learning tours to countries with similar realities and successful experiences on Forest and Landscape Restoration (FLR) applicable to the Serbian context.

Adherence with Relevant National Policies (see annex 4)

Adherence with Relevant National Laws and Regulations (see annex 5)

Adherence with Serbia Nationally Determined Contributions

134. The Republic of Serbia ratified the UN Framework Convention on Climate Change (UNFCCC) on March 12, 2001. Although Serbia, as a non-Annex 1 party to the Convention does not have quantitative obligations to limit the greenhouse gas emissions, Serbia has submitted its Intended National Determined Contributions INDC to the UNFCCC [30], defining the country's official position to combat climate change in a long-term perspective.
135. The greatest impacts of climate change have been observed in agriculture, hydrology, forestry, human health and biodiversity [21]. Taking into account the impacts of climate change and the need to reduce the risk thereof and recognizing the importance of its contribution to global GHG emission reduction, the Republic of Serbia has identified and pledged GHG emissions reduction at the national level.

136. The national objective is defined as a reduction to be implemented in the period between 1 January 2021 and 31 December 2030. The goal is a reduction of greenhouse gas emissions by 9,8% until 2030 compared to base-year (1990). In 2010, the Republic of Serbia, associated with the Copenhagen Accord expressed readiness for a voluntary GHG emission limitation until 2020 by 18% compared to emissions in 1990, but failed to reach this target.
137. Since 2000 the Republic of Serbia has faced several significant extreme climate and weather episodes that have caused significant material and financial losses as well as losses of human lives. The two most prominent events are the drought in 2012 and the floods in 2014. The drought in 2012 was particularly strong and caused a decrease in yields of some crops by 50%. Estimates show that the droughts in 2000, 2003, 2007 and 2012 caused over 3.5 billion Euros of damage and the floods in 2014 over 1.5 billion Euros. Estimates further show that the material damage induced by forest fires in the period 2000-2009 is worth more than 300 million Euros.
138. Climate change will affect the spatial variation in agro-climatic conditions, the conditions for plant breeding and the selection of suitable varieties, and warming will also affect the phenology of plants. Certain scenarios for the period 2071-2100 indicate the expected corn yield reduction from -52 to -22% for the whole territory of the Republic Serbia, for conditions without irrigation. The impact on other crop and vegetable varieties can also be expected. As regards biodiversity and natural ecosystems, changes in climate may lead to changes in the phenological cycles; morphological changes, physiology and behavior of species; loss of existing habitats and emergence of new species; changes in the number and distribution of species; increased number of pests and diseases; genetic changes and extinction of species unable to adapt. Impacts of climate change on health are becoming more pronounced in recent years. During the heat wave in July 2007, increased mortality was recorded in Belgrade. Climate change will certainly lead to changes in the distribution and increase in frequency of vectorborne infectious diseases (malaria, dengue fever, West Nile virus, etc.), as well as the spread of infectious diseases through water.
139. In the period between 2000 and 2013, 1.15% of total land area was subjected to a change in land use. The most significant changes occurred in urban areas, where pastures and agricultural land were converted into construction sites. The present condition of forests is characterized by scarce forestry stocks, negative growth-age relationship, insufficient forest cover and forest stand densities, unfavorable forest structure and tree species, as well as unsatisfactory state of forest health [\[21\]](#).
140. According to the 2nd National Communication on climate change (2017), the vulnerability of Serbia's forest to climate change will increase considerably in the 21st century. According to the forest aridity index used for main forest tree species in Serbia (which is usually below 10 in reference period 1961-1990) will be drastically changed. By the end of the century those values will rise to above 15 in some parts of country. Thus, the least favorable conditions for forests in the 20th century will be the best conditions in the period 2071-2100.
141. When formulating adaptation measures for changing climatic conditions in the forestry sector, it is important to take account of the tree species, as well as the fact that afforestation will be increasingly difficult so the main proposed measures for reducing of biotic and abiotic disturbances through building adaptive capacity of Serbian forests were defined [\[21\]](#): (1) building fire protection forest roads in fire-prone regions; (2) early treatment of pests; (3) management of thinning of conifer plantations; (4) promotion of mixed forests; (5) promotion of uneven-aged forests; (6) choice of adequate tree species, provenances, population and genotypes, which show higher tolerance to altered climate conditions or are specially adapted to potential climate conditions in the future; (7) introducing the practice of adaptive management of forests and forest resources in order to adapt to climate change; (8) change of forest management practices and promotion of "close-to-nature" forest management concept; (9) more intense rehabilitation of degraded lands by afforestation, after mining and industrial activities, and (10) prevention of

erosion and landslides. Proposed measures cover policy, monitoring and research, capacity building as well as measures in awareness raising. The forestry related activities of this project will contribute to reaching the above-mentioned national commitments.

Contribution to Project Results

142. **Project Result 1. By year 7, at least 500 thousand hectares (22% of total present forest cover) are under sustainable and Climate Adaptive Silviculture Practices (CAS):** Forests are crucial for the well-being of humanity. They provide foundations for life on earth through ecological functions, by regulating the climate and water resources and by serving as habitats for plants and animals. Forests also provide a wide range of essential goods such as wood, food, fodder and medicines, in addition to opportunities for recreation, spiritual renewal and other services.
143. Serbia's forests are characterized by high genetic, species and ecosystem diversity. However, forest degradation, along with resulting habitat loss and fragmentation, is one of the key environmental problems at present, resulting in loss of forest carbon, biodiversity and other key ecosystem goods and services, including the potential to act as carbon sinks. Root causes of forest degradation include illegal extraction of timber, frequent forest fires, as well as pressures from the agriculture, energy and construction sectors. 12 million Serbian households, particularly in poor rural areas, rely on fuelwood to cover their energy needs. It is estimated that about 6.47 percent of the total territory of Serbia is degraded (UNCCD default data 2001-2015), the related annual cost of land degradation in Serbia is estimated at USD 254 million. This is equal to 7.6 percent of the country's agricultural GDP.
144. Land degradation in the Republic of Serbia leads to a reduction in the provision of ecosystem services that take different forms – decline in food availability, soil fertility, carbon sequestration capacity, wood production, groundwater recharge, etc. – with significant social and economic costs to the country. As a solution, restoration of degraded and deforested landscapes has gained recognition at the international level as a way for countries to achieve multiple national and international priorities on mitigating climate change, improving livelihoods, reducing desertification and conserving biodiversity. Restoring degraded and deforested landscapes using the Forest Landscape Restoration (FLR) approach would be the cost-effective long-term sustainable nature-based solution in the region.
145. However, to accelerate the adoption of a FLR approach on a larger scale in Serbia, the main root causes and bottlenecks to address the forest - decarbonization nexus are to be overcome, namely: (I) the adaptation deficit of forestry's stakeholders (public and private) and the incomplete mechanisms for forest assessment, monitoring and management; (II) the incomplete strategic, policy and legal framework to ensure the optimal contribution of the AFOLU sector to the decarbonization process of the Serbian economy; and (III) the limited incentives for private sector engagement in sustainable forest management and in decarbonization
146. Although policies and long term strategies for the forestry sector are in place, the lack of reliable and up-to-date information on the current status and dynamics of forest ecosystems of Serbia seriously hampered evidence-based decision making in relation to forest governance and management issues at local, regional and national levels. In response to the demand for reliable information on forest and tree resources in Serbia, the 2nd National Forest Inventory has been conducted within the framework of the GEF6 forestry project (GCP/SRB/002/GFF) which delivers for the first time up-to-date information which goes beyond timber-related key attributes, such as forest health, carbon stock, biodiversity, etc.
147. However, the impacts of climate change on forest ecosystems and other wooded lands require a continuous process of closely monitoring forest and tree resources as well as other land uses to

recognize and address undesired developments in a timely manner. Therefore, the project will support establishing a national forest monitoring and assessment (NFMA) system, to generate cost-effective information on forests and trees outside forests, including all benefits, uses and users of the resources and their management.

148. The project will place special attention on monitoring the state and changes of forests, and on their social, economic and environmental functions, to provide evidence and inform authorities as well as the public in a transparent and consistent manner on the forest sector's performance. Thus, the project will raise awareness and stimulate public discussions about the need of changes in forest governance, institutional set-up and management practices, as well as to embrace an ecosystem-based adaptation approach, holistically addressing the environmental, social and economic challenges of forest restoration in a climate change scenario.
149. The continuous provision of up-to-date information on forest dynamics in the country during the lifetime of this project and beyond will also allow to bring up the existing carbon monitoring, reporting and verification (MRV) system of Serbia up to international standards. The NFMA will also provide valuable information about the actual uptake of climate adaptive silviculture (CAS) practices in day-to-day forest management and operations at field level.
150. The PEs, administration at central, regional and municipal levels, as well as communities will require time and incentives to shift from the BAU scenario to new approaches in governance of forest and tree resources, as well as management of climate change's impact on forest ecosystems and related land uses at all levels. The project will assist public and private stakeholders to get involved in CAS, as well as support the upgrading of national curricular of relevant educational institutions.
151. **Project Result 2. By year 7, 40,000 ha of forests are restored to ensure the energy security and livelihoods of over 300,000 households while increasing carbon removals by 1.4 million tonnes of CO₂e:** In line with the Draft Low Carbon Development Strategy with Action Plan (2019) [\[29\]](#) underlying principle of applying an ecosystem-based adaptation approach to the proposed national contributions on climate change adaptation and mitigation, the project aims to restore forest ecosystems and to afforest degraded agricultural and other lands to enhance ecological processes and ecosystem services, while at the same time fostering climate resilience. The project will increase diversity at different levels:
 - a) genetic diversity from different populations of the same species in order to increase the gene pool of collected seeds and therefore the probability of having a representation of varieties better adapted to drought, frost, pests, etc;
 - b) species diversity by mixing different trees and shrubs in the same restoration site, as a way to accelerate the recovery of the forest ecosystem, in terms of plant composition, structure and ecological processes, and consequently enhance ecosystem services and the resilience against climatic risks.
152. The project has selected a number of native tree and shrub species of the reference ecosystems that better suits future climate conditions in Central Serbia as well as Vojvodina region. These species have a wide ecological range (they grow under large temperature and precipitation gradients), and the capacity to withstand drought, re-sprout after fire and to attract seed-dispersal fauna.
153. **Central Serbia:** Most of Serbia has a temperate continental climate. A continental climate prevails in the mountainous areas of over 1,000 metres. The climate in the Serbian southwest borders on the Mediterranean subtropical and continental. Central Serbia is rich in diversity of forest tree species and forest types. Along the riverbanks of Danube and Sava forests are characterized by Salix, Ulmus and Betula forest type, followed by Fraxinus-Alnus and Quercus robur forests in low

plains. In hilly and mountainous regions 38 beech and oak forest types are determined (*Fagus sylvatica* and *Q. pubescens*, *Q. frainetto*, *Q. petraea*, *Q. cerris*) together with conifer forest species on high altitudes (*Abies alba*, *Pinus silvestris*, *P. nigra*, *Picea abies*) in pure or mixed forest types.

154. In overall, broadleaved forests represent 90.7% of forest cover (beech 27.6% and oak 24.6%, other hardwood species with 6.0%, poplars 1.9%, other softwood tree species, like willows 0.6%, mixed broadleaved forests 30%), while conifers cover 6.0% and mixed forests 3.3% of the territory under the forest of Serbia.
155. The climate projections for Serbia indicate for the period 2050-2100 (when planted trees will reach maturity) significant increase in annual temperature, quite stable annual precipitation but with a very large year to year variation and an increased occurrence of extreme heat waves [29]. The proposed temperate native species that show higher capacity to withstand the predicted climate changes are:

| Species ⁴ | Attributes ⁵ | | | | | Rationale |
|----------------------------|-------------------------|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | DR | RS | SD | SS | FG | |
| <i>Picea abies</i> | | | | | | Norway spruce could be used in ranges from 1000 to 1300 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Abies alba</i> | | | | | | European silver fir could be used in ranges from 900 to 1100 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Acer heldreichii</i> | | | | | | Heldrich's maple could be used in ranges from 1200 to 1800 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Fagus sylvatica</i> | | | | | | European beech could be used in ranges from 600 to 1500 m. It shows a moderate resistance to drought. Possible for re-sprouting, browse and cutting. The plant material could be both direct seed sowing and seedlings produced in forest nurseries. |
| <i>Fraxinus excelsior</i> | | | | | | European ash could be used in ranges from 600 to 900 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Prunus avium</i> | | | ++ | | | Wild cherry could be used in ranges from 600 to 900 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. Fruit tree attracting seed-dispersal fauna. The plant material could be seedlings produced in forest nurseries. |
| <i>Acer pseudoplatanus</i> | | | | | | Sycamore maple could be used in ranges from 600 to 900 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Acer platanoides</i> | | | | | | Norway maple could be used in ranges from 600 to 900 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Sorbus torminalis</i> | | | + | | | Chequer tree could be used in ranges from 600 to 900 m. It shows a low resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |
| <i>Corylus colurna</i> | + | | + | | | Turkish hazel could be used in ranges from 600 to 900 m. It shows a moderate resistance to drought. Possible for re-sprouting. The plant material could be seedlings produced in forest nurseries. |
| <i>Pinus sylvestris</i> | ++ | | | | | Scots pine could be used in ranges from 400 to 900 m. It shows a moderate resistance to drought. No possible for re-sprouting after fire, browse and cutting. The plant material could be seedlings produced in forest nurseries. |

DR: Drought-resistant; RS: Re-sprouting after fire, browse and cutting; SD: fruit tree attracting seed-dispersal fauna; SS: instable soil stabilization; FG: colonizer of forest gaps and open areas

| | | | | | | |
|------------------------------|----|---|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Pinus nigra</i> | + | | | | | Black pine could be used in ranges from 200 to 500 m. It shows a high resistance to drought. The plant material could be seedlings produced in forest nurseries. |
| <i>Quercus petraea</i> | + | | | | | Sessile oak could be used in ranges from 300 to 500 m. It shows a moderate resistance to drought. Possible for re-sprouting. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Quercus frainetto</i> | ++ | | | | | Hungarian oak could be used in ranges from 200 to 400 m. It shows a moderate to high resistance to drought. Possible for re-sprouting. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Quercus cerris</i> | ++ | | | | | Turkey oak species could be used to ranges to 300 m. It shows a moderate resistance to drought. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Quercus pubescens</i> | ++ | | | | | Downy oak could be used in ranges from 200 to 400 m. It shows a moderate to high resistance to drought. Possible for re-sprouting. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Quercus robur</i> | ++ | | | | | Pedunculate oak has a wide ecological range and capacity to withstand drought. The plant material for restoration could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Fraxinus angustifolia</i> | | | | | | Narrow-leaved ash is present on hydromorphic soils, very low resistance to drought. The plant material could be both seed, and seedlings produced in forest nurseries. |
| <i>Populus alba</i> | | + | | | | White poplar colonizes is low resistance to drought The plant material is seedlings produced in forest nurseries. |
| <i>Carpinus betulus</i> | | | | | | Hornbeam is present on hydromorphic soils, low to moderate resistance to drought. |
| <i>Salix alba</i> | | | | | | White willow is present on hydromorphic soils with low resistance to drought. |
| <i>Carpinus orientalis</i> | ++ | | | | | Oriental hornbeam could be used in ranges from 100 to 450 m. It shows a moderate to high resistance to drought. Possible for re-sprouting. The plant material could be seedlings produced in forest nurseries. |
| <i>Ostrya carpinifolia</i> | ++ | | | | | European hop hornbeam could be used in ranges from 100 to 400 m. It shows a moderate to high resistance to drought. Possible for re-sprouting. The plant material could be seedlings produced in forest nurseries. |
| <i>Fraxinus ornus</i> | ++ | | | | | Manna ash could be used in ranges from 150 to 400 m. It shows a moderate to high resistance to drought. Possible for re-sprouting. The plant material could be seedlings produced in forest nurseries. |

Table 12 List of Proposed Species for FLR in Central Serbia

156. **AP of Vojvodina:** Vojvodina has a continental climate. Summer temperature in Vojvodina can reach up to 40°C, although the average temperature is around 22 °C, while in winter it may reach down to -29°C. In Vojvodina forest areas are concentrated in the river valleys and on mountainous areas of Fruska gora and Vrsacki breg. Forest types in river valley are characterized by pedunculate oak forests (*Quercus robur*) as well as poplar (*Populus x euramericana*) and willow (*Salix alba*) plantation with *Fraxinus angustifolia*. *Ulmus minor*, *Ulmus laevis*, *Carpinus betulus*, *Populus alba*, *Populus nigra*. Mixed sessile oak forests (*Quercus petraea*) are prevalent on Fruska gora and Vrsacki breg with mostly *Tilia tomentosa*, *Fagus sylvatica* and *Prunus avium*. Floodplain forests the occurrence of invasive species is on the rise, mainly: *Amorpha fruticosa*, *Ailanthus altissima*, *Acer negundo* and *Fraxinus pennsylvanica*.
157. The climate projections in Vojvodina indicate for the period 2050-2100 (when planted trees will reach maturity) moderate to significant increase of annual temperatures, slight decrease in annual rainfall and the intensification of summer drought conditions. Forest fire risk might significantly increase. Under these conditions, the most suitable native species for forest restoration are:

| Species ⁶ | Attributes ⁷ | | | | | Comments |
|---------------------------------------------------|-------------------------|----|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | DR | RS | SD | SS | FG | |
| <i>Quercus robur</i> | ++ | | + | | | Pedunculate oak has a wide ecological range and capacity to withstand drought. The plant material for restoration could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Quercus petraea</i> | + | + | + | | | Sessile oak could be used in ranges from 300 to 500 m. It shows a moderate resistance to drought. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Quercus cerris</i> | ++ | + | + | | | Turkey oak species could be used to ranges to 300 m. It shows a moderate resistance to drought. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Fraxinus angustifolia</i> | | | | | | Narrow-leaved ash is present on hydromorphic soils, very low resistance to drought. The plant material could be both seed, and seedlings produced in forest nurseries. |
| <i>Populus euramericana</i> | | + | | | | This species colonizes is low resistance to drought The plant material is seedlings produced in forest nurseries. |
| <i>Populus alba</i> | | + | | | | White Poplar colonizes is low resistance to drought The plant material is seedlings produced in forest nurseries. |
| <i>Populus nigra</i> | | | | | | Black pine colonizes is low resistance to drought The plant material is seedlings produced in forest nurseries. |
| <i>Ulmus minor</i> | | | | | | Field elm is present on hydromorphic soils, mid resistance to drought. Endangered species. |
| <i>Ulmus laevis</i> | | | | | | Fluttering elm is present on hydromorphic soils, mid resistance to drought. Endangered species. |
| <i>Carpinus betulus</i> | | | | | | Hornbeam is present on hydromorphic soils, mid resistance to drought. |
| <i>Quercus frainetto</i> | + | + | + | | | Hungarian oak could be used to ranges to 300 m. It shows a moderate resistance to drought. The plant material could be both acorns (direct seed sowing) and seedlings produced in forest nurseries. |
| <i>Robinia pseudoacacia</i> | ++ | | | | | Black locust is widely present in Vojvodina, with a wide range of resistance to drought. The plant material could be seedlings produced in forest nurseries. |
| <i>Celtis australis</i> | ++ | + | + | | | European nettle tree is widely present in East Serbia, with a range of resistance to drought. The plant material could be seedlings produced in forest nurseries. |
| <i>Tetradium daniellii</i> var. <i>hupehensis</i> | + | | | | | Bee tree has possibilities for afforestation, middle range in resistance to drought. The plant material could be seedlings produced in forest nurseries. |
| <i>Ostrya carpinifolia</i> | * | | | | | European hop hornbeam is present on shallow and dry soils of dominantly East Serbia. Should be considered for Vojvodina. |

DR: Drought-resistant; RS: Re-sprouting after fire, browse and cutting; SD: fruit tree attracting seed-dispersal fauna; SS: instable soil stabilization; FG: colonizer of forest gaps and open areas

| | | | | | | |
|-------------------------|----|---|---|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Fraxinus ornus</i> | * | | | | | Manna ash is present on shallow and dry soils of West and East Serbia. Should be considered for Vojvodina. |
| <i>Sophora japonica</i> | + | | | | | Japanese pagoda tree has possibilities for afforestation in lowland according in resistance to drought |
| <i>Tilia sp.</i> | + | | | | | Lime tree species have possibilities for afforestation, in lowland to middle range in resistance to drought |
| <i>Acer tataricum</i> | ++ | | | | | Tatarian maple is present in lowland forests steppe zone in Vojvodina, with a wide range of resistance to drought. The plant material could be seedlings produced in forest nurseries. |
| <i>Prunus spinosa</i> | | | | | | Blackthorn is present in Vojvodina, with a wide range of resistance to drought. The plant material could be seedlings produced in forest nurseries. |
| <i>Rosa sp.</i> | + | + | + | | | Rosa species are present in Vojvodina, with a wide range of resistance to drought. The plant material could be seedlings produced in forest nurseries. |

Table 13 List of potential Species for FLR in Vojvodina (only native species will be used in the project)

158. In addition to the changing climate conditions salt affected soils further hamper the planning of future afforestation. It is estimated that about 106,622 ha of salt affected areas or about 4.2% of the territory occur in the AP of Vojvodina. Different types of salinated soils are found mainly in Southern-Bačka, Banat and Srem sub-regions [31]. Salt dissolved in water disturb the life functions of the vegetation and are toxic in higher concentrations. In certain parts of Vojvodina the salinization and/or alkalization of soils have been caused by fluctuating saline groundwaters which exert their harmful influence on the upper soil layers. Consequently, when planning afforestation on salt affected soils, consideration must be given to both the solonchak and solonetz types of soils, and also to the water soluble salts [32].
159. The toxic effect of the salts is strongly felt by the majority of woody plants, with different threshold values of tolerance depending on the species. A salt content of 0.10% or a phenolphthalein alkalinity of 0.05% does not usually affect trees. Poplars are sensitive to a salt content of over 0.15% and cannot be grown above 0.20%. There are, however, differences between poplar varieties. For *Quercus robur* the corresponding salt tolerance threshold values are 0.20-0.25%, while the phenolphthalein alkalinity tolerance is 0.10-0.15%. Higher salt contents are tolerated by *Elaeagnus angustifolia* and *Tamarix* species (*T. odessana*, *T. tetrandra*) to a threshold value of 0.5%. On the basis of previous trials, *Ulmus pumila* var. *arborea* cv. *Pushta* on saline soils tolerates salt contents up to 0.50%. On soils with a salt content of over 0.50% or a phenolphthalein alkalinity over 0.20% no tree or shrub species can survive under Carpathian basin ecological conditions. It is worth noting that *Elaeagnus angustifolia*, which has a shallow root system, exerts a significant ameliorative effect, since the free nitrogen of the air is fixed in the soil by the microorganisms which live in symbiosis with the roots. Consequently, rich undergrowth with a high N requirement develops, leading to an enrichment of the soil with organic matter.
160. The most important tree species for afforestation on salt affected soils are the oak (*Quercus robur*, or *Quercus cerris* on drier calcareous soils), the poplar and, under sufficiently moist conditions, the white willow (*Salix alba*). Under more favourable conditions these species are capable of producing good timber growth of high commercial value even on salt affected growing sites. As part of protective forest belts (soil conservation, protection from wind erosion) *Ulmus pumila* may also be successfully planted on salt affected soils. In addition, *Fraxinus pennsylvanica* and *Pyrus pyraeaster* may be worth to mentioned in the context of tolerating salt affected sites but will not be

promoted by this project.

161. According to field trials at the Püspökladány Experimental Station of Hungarian Forest Research Institute, the most salt and drought-tolerant of native tree species in Hungary – and which are also native to Vojvodina - are the pedunculate oak (*Quercus robur*), the turkey oak (*Quercus cerris*), the wild pear (*Pyrus pyraeaster*), and the white poplar (*Populus alba*). In addition, there are some non-native species of trees and shrubs, native mainly to Asia, which adapted very well to the conditions of salinated soils.

| Species ⁸ | Attributes ⁹ | | | | | | Rationale |
|-------------------------|-------------------------|----|---------|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | DR | RS | SD | SS | TS | FG | |
| <i>Quercus robur</i> | ++ | + | | | + | | Pedunculate oak is native to temperate parts of Europe. Its vast range extends from Ireland to the Ural Mountains. It occurs in large numbers in the Danube, Drava and Sava valleys, as well as in Eastern Europe (Gencsi L., Vancsura R. 1992). It is mainly a tree in the lowlands and low hills, and is favoured in the plains of the great rivers. In Hungary, it plays a prominent role in the forests of the Great Plain with compacted and salinated soils. It does not tolerate prolonged flooding. Larger mortality caused by pests often causing significant damage is in oak stands. Its wood is used by the furniture industry, construction industry and transport industry. It is one of the most common tree species in other wooded land. It was one of the main tree species of the shelterbelts in the Great Plain. In addition to providing excellent timber, the oaks provide food for many species. |
| <i>Quercus cerris</i> | ++ | + | | | + | | Sub-Mediterranean, Eastern Mediterranean tree species. Thus, it is native to south-eastern Europe, southern Europe (south of the Brno-Zvolen line) and Asia Minor (Gencsi L., Vancsura R. 1992). It is one of the most widespread tree species in Hungary, with a total area of 176 000 ha (11.4% of forests in Hungary). Turkey oak is a xerotherm tree species, so it appears mainly on the southern sides. It does not tolerate strong, persistent cold and late frosts. In contrast, it tolerates drought well and lives on shallow skeletal soils, poor gravel and clay. It is very light-demanding, sprouts well and grows quickly at a young age. Several varieties of turkey oak are known, the most common of which is ' <i>Quercus cerris</i> var. <i>cerris</i> and var. <i>Austriaca</i> . The "austriaca" version stands out with better shape and technical properties. It is growing rapidly in young ages. It regenerates perfectly from sprouts. Sensitive to bark injuries. It is drought tolerant and can survive 350 mm of rainfall per year. Its ability to associate with other tree species is good. Its foliage is consumed by few insects. Its most important pest is the gypsy moth (<i>Limantria dispar</i>). Its wood cannot resist the damage of wood-destroying fungi (due to its low tannic acid content). Its wood is used for parquet and furniture, fibreboard production, paper and pulp industry. |
| <i>Pyrus pyraeaster</i> | ++ + | + | ++ + | | ++ | + | European wild pear is native to Europe, reaching its optimum in the sunny, warmer plains and hills. It tolerates temperature extremes, prolonged droughts and salt-affected soils, so it plays an important role in the afforestation of the Great Plain. This third-order tree, which reaches a height of 15 m, is one of the most common forest fruit trees. Its fruit is an important forest by-product and excellent game feed. It is one of the host-plant of the large emperor moth (<i>Saturia pyri</i>). It has fungal parasites. Its wood is easy to carve, fine- |

⁸ The species names are updated according to the most recent taxonomic updates: (i) The Euro+Med PlantBase (ww2.bgbm.org); (ii) The Plant List theplantlist.org.

⁹ DR: Drought-resistant; RS: Re-sprouting after fire, browse and cutting; SD: fruit tree attracting seed-dispersal fauna; SS: instable soil stabilization; TS: Tolerated level of salinity; FG: colonizer of forest gaps and open areas

| | | | | | | | |
|------------------------------------------------------------------|---------|----|---|---------|----|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | | textured, sought-after industrial raw material. It can be planted under unfavourable site conditions. |
| <i>Populus alba</i> | ++ + | ++ | | | ++ | + | <p>White poplar has a fairly large area of distribution, stretching from Central and Southern Europe through Asia Minor and Central Asia to China. The tree grows mainly in the plains and in the areas along rivers. It can be found up to an altitude of 300 m above sea level.</p> <p>Despite its rapid growth, it can reach a very high age. Older trees often rotten, providing nesting opportunities for many nesters. It is a fast-growing tree species with very good vegetative expansion. Its root pieces regenerate well. Raising of seedlings is done from seed, which is a labor-intensive task that requires a lot of care. Drought tolerant, tolerates intermittent flooding. A pioneer species. Less resistant to bacterial and fungal pathogens. In old age, its wood often becomes false heartwood, pit rot caused by fungi. The industrial applicability of its wood is limited (pellet production, fibreboard production, paper production).</p> |
| <i>Tamarix tetrandra</i> | ++ + | ++ | + | ++ + | | ++ | <p>The four-stamen tamarisk (<i>Tamarix tetrandra</i>) is a widely spread, deciduous, 1-3 meter high shrub with curved stems. Its deep-seated roots penetrate to the saturation zone of the soil, i.e., the groundwater, from where they absorb water. Its roots also cope with the highly saline, clayey soils. Bark dark brown, the branches are complimenting, arching downwards. Its scaly leaves reduce the evaporation surface. Their ability to absorb salt is unlimited because they can excrete excess salt through their leaves. Its nectar is liked by bees. The fruit, which ripens in July, is spread with 5-6 mm long pods, its seeds are spread with the help of flying hairs.</p> <p>Tamarisk primarily needs sun and good aquifer soils. Four-stamen tamarisk with its deep penetrating roots and scaly leaves adapts well to the dry, hot climate, frost tolerant. It is salt-tolerant, tolerates air-polluted urban environments, and is therefore planted as a hedge by highways and roads. In barren areas, it regenerates from root fragments left in the soil. It is also excellent for windbreaks.</p> |
| <i>Ulmus pumila</i> var. <i>arborea</i> cv. <i>Pusztai</i> | ++ + | ++ | | ++ + | | + | <p>Depending on the site conditions, the Siberian elm's height increase is very varied: from the third-order, almost bush-like trunk size, the tree reaches the height increase of the domestic elm. Its tolerance is very wide. It can withstand both dry and heavily variable water management sites, as well as periodically over-wetting (wet to the surface). It can also be planted successfully on salinated soils where, according to our previous knowledge, only shrubby Russian olive could be planted, as well as on dry sandy soils, soils with high lime content, various eroded, degraded, nutrient-poor areas with highly variable water supply. It retains its rapid growth properties in these areas as well, but there can be large differences in the rate of growth. It is a remarkable feature that it can withstand the unfavourable microclimatic environment and polluted air in the city without damage. Its great advantage is that it is still resistant to <i>Ceratocystis ulmi</i>, according to both domestic experience and foreign literature data, even under extreme conditions. To date, we have no knowledge of any other specific species of disease.</p> <p>Suitable for protective forests, shelterbelts and greening urban areas. It can be used for the recultivation of opencast mining, quarries and various waste dumps, eroded areas, damaged areas bordering the settlements (e.g. former clay pits). In urban areas, its big advantage is that it can withstand the dry and polluted air of city streets, which is preferably accompanied by its rapid growth and decorative foliage (stem-forming prunings are needed). It has a very high drought tolerance and can survive 250 mm of precipitation per year.</p> |
| <i>Fraxinus pennsylvanica</i> | ++ | + | | ++ | | ++ | <p>As a neo-arctic species, the Green ash is native to the eastern North American flora of the Atlantic-North American region, but due to its advantageous properties it is planted in many parts of the temperate zone. It is an invasive species in Hungary.</p> <p>In Hungary, it was planted mainly in the saline oak groves and in the lowland floodplain groves in mixed stands, as due to its high light demand, the purely ash forests are extinct. A big</p> |

| | | | | | | | |
|--|--|--|--|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | | <p>advantage over other ash species is that the game does not harm it. It is also highly resistant to plant pests that are widespread in Europe. It grows rapidly in the first years, but only on soils rich in nutrients. It regenerates quickly, therefore, unlike the ash species native to Hungary, the soil under it does not get weeding. It naturally regenerates well even on saline soils.</p> <p>It tolerates prolonged flooding well. Pests and game avoid it due to its high coumarin content.</p> |
|--|--|--|--|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Note: +: to a small extent, slightly

++: to a large extent,

+++: to a very large extent

Table 14 List of Potential Species for FLR on salinated soils in Vojvodina (only native species will be used in the project)

Group of Activities

| | Group of Activities | Main Counterparts | Scale | Targets |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component 1 | 1.1. Technical assistance to strengthen the existing forest management and monitoring policy framework. | Min. of Agriculture, Forests and Water Management (MAFWM) Min. of Mining and Energy (MME) Min. of Environment Protection (MEP) | Serbia | <ul style="list-style-type: none"> • The national Forest Monitoring and Assessment System (NFMA) is established, • The national strategy, action plan and execution guidelines for wood energy value chain are delivered, • Guidelines for decision makers on LULUCF to prevent soil degradation are delivered, • The national standard for biomass production / handling and use is delivered. |
| | 1.2. Technical assistance to upgrade the existing Measurement, Reporting and Verification system and to support the creation of a national offsetting and inseting option. | MAFWM Min. of Economy (MoE) | | <ul style="list-style-type: none"> • The national MRV system is upgraded (in relation to forestry) and operational, • 1 national carbon offsetting/insetting optionⁱ is validated. • 1 regional knowledge-sharing platform for national offsetting/insetting mechanisms in placeⁱⁱ. • The national decarbonization facility is established. |

Table 15 Main Activities and Deliverables of project component 1

162. **Group of Activities 1.1. Technical assistance to strengthen the existing forest management and monitoring policy framework:** To be in position to judge on the sustainability of management of forest resources at various levels (national, regional and forest enterprise levels), their sustainable use and provision of services require reliable and up-to-date information on their current status and dynamics. In the past, information about forests has been traditionally obtained through operational forest inventories which have been designed to support management decisions at the forest enterprise level for the next ten years. Because of the application of ocular methods and the use of prediction models (yield tables) which simplify real condition of forest, the information value obtained from operational inventories is limited as it is often seriously biased, typically underestimating tree volumes and growth. Their thematic scope is usually limited to wood production and extraction, whereas other information needs are not addressed at all (dead wood balance, growth dynamics, forest health, soil condition, biodiversity etc.). For these reasons operational inventories are not the best source of information to support decision making and forestry sector development at a country level.
163. For this specific purpose statistically-sound national forest inventories have been invented, using scientifically proven methods of probability sampling to assess in an unbiased manner the

condition and dynamics of forests at the whole country or even regional level. It has been only recently that national forest inventories started to evolve towards continuous forest monitoring systems. Building on the methodology, sampling design and preliminary results of the currently ongoing 2nd National Forest Inventory (due to finish in the first half of 2023 with publishing the final results) the project will establish such a continuous national forest monitoring and assessment (NFMA) system using permanent sample plots (repeatedly assessed in the field) which proved to be most straightforward and accurate approach to estimate dynamic variables such as change of forest area, change of growing stock, biomass growth and drain (mortality and amount of cuts), carbon storage, etc.

164. A continuous forest monitoring system also allows for evaluation of results on an annual basis so that decision-makers and decision-making processes can rely on a permanent inflow of unbiased and relevant information on the actual condition of forests and latest trends in timber harvesting, carbon storage, etc. The continuous monitoring system with its annual design will also reduce fluctuations in budget and human resources, and lead over time to mature technological and methodological solutions.
165. The approach used by the project will guarantee the technical sustainability of the visual interpretation part of the NFMA by 1) using a free and open source software for land use monitoring, namely Collect Earth developed by the FAO, 2) establishing baseline data on land categories and assessing land use changes on a rolling basis, and 3) continuously training and supporting staff of the Institute of Forestry in Belgrade in forest monitoring. As the land use and forest monitoring will become an integral part of Institute's tasks and responsibilities after the closure of the GEF6 forestry project (GCP/SRB/002/GFF) currently in charge of the 2nd NFI in Serbia, the financial sustainability is also ensured.
166. The project will also deliver regular trainings and support to the field teams in field data collection to maintain common quality standards and consequently ensure the credibility of results of the forest assessment and monitoring. The field work will be provided as government contribution to the project after the initial phase of the NFMA, so as to ensure full "ownership" of the Serbian counterpart and the NFMA's continuation after the lifetime of the project.
167. The project will further deliver 1) National strategy and action plan including execution guidelines for wood energy plantations; 2) Guidelines for decision-makers on LULUCF (Land use, land use change and forestry) to prevent soil degradation; and 3) National standard for biomass production / handling and use. These documents will complement the guideline documents developed within the context of the above-mentioned GCP/SRB/002/GFF project and further strengthen the existing policy framework for management of forest and related land uses as well as their products and services. The guideline documents developed under GCP/SRB/002/GFF are: i) Nature value assessment of forest stands biodiversity indicators and related field guides for forest management planning; ii) Guidelines for forest management and iii) Guidelines for mapping key sites in forest ecosystems.
168. **Activity 1.1.1: Establish the national Forest Monitoring and Assessment System (NFMA):** During the second quarter of year 1 the project will organize a national information needs assessment workshop, inviting all relevant stakeholders interested in forestry and sustainable use of forest resources of Serbia, to discuss and shape on the basis of the findings and the scope of future forest monitoring activities being based on the results and lessons learned from the implementation of the 2nd NFI. Based on the analysis of information needs and of adjustments needs to the recent methodological approach of the NFI a forest monitoring system will be designed by the end of the third quarter of year 1 and the design presented and discussed at a validation workshop in the

fourth quarter of year 1. The field survey of the inventory cycle will start in the beginning of year 2 and finish in year 6 as to allow for the subsequent inventory cycle to start during year 7 of the project. In this way, the set of permanent plots visited in the field during the first year of the project's inventory cycle will be surveyed a second time during the lifetime of the project and the variables describing changes and forest dynamics can be re-assessed and fine-tuned as appropriate. Thus, the information potential of the monitoring system can be fully developed and also recognized by the national stakeholders. Dynamic variables such as forest area change, forest growth, forest health, amount of wood harvesting and carbon storage are essential for evidence-based decision making, shaping efficient forestry policies and improving forest management practices at the whole country level.

169. In a first step the current situation concerning land categories will be assessed in year 1 via a Collect Earth (CE) survey assessing 300,000 sample points evenly distributed over the whole country. In the following years 2 - 7 the CE Survey will continue using the most up-to-date images available. This survey will consist of the visual interpretation of sample points (plots) on the basis of high resolution imagery available by Google Earth, Earth Engine and Bing Maps and regularly cover the whole territory of Serbia. Land categories and their changes are among the most important plot attributes which need to be assessed by operators for each sample plot.
170. The main purpose of the CE survey is:
 - To reduce the amount of field work by not visiting plots which are obviously outside of forest (and of any other target land category).
 - To increase accuracy of estimates of key target parameters (total forest area and its changes, or total biomass and carbon stock and their changes).
171. The accuracy of estimates for smaller regions within Serbia (subregional level) or when using just one annual set of field sample plots (panel) would be insufficient without CE data. A specific training on CE interpretation for new staff and a refresher for staff recently involved in the first phase of the 2nd NFI under GCP/SRB/002/GFF is planned in the second half of year 1 before the actual interpretation work starts in year 2 of the project.
172. International experts on forest assessment and monitoring, on Geographic Information Systems (GIS) and RS as well as Database/IT development and management will perform a series of trainings starting in year 1 of the project and provide technical guidance and support on demand during the implementation of the monitoring system which usually goes through several stages of technological and methodological development. In this way, trial and error situations will be avoided and the tight time schedule for the implementation of the inventory and monitoring activities can be followed while at the same time ensuring that international quality standards of data and information on the forest resources are met. In total 600 participant days for workshops and trainings are planned under this activity for the whole lifetime of the project. As part of the capacity development four Serbian experts will be sent on a two-week learning tour to a country in Europe with long term experience in forest assessment and monitoring. A Letter of Agreement (LoA) will be signed with the respective host institution to compensate for incurred expenses and overheads due to the visiting experts participating in the learning tour.
173. Field data collection will start in year 2 and continue till year 7 of the project when the plots established in year 1 of the first inventory cycle will be re-visited and re-assessed. In year 3 of the project (second year of the first project's inventory cycle) preliminary results will be evaluated using a limited number of sample plots of the inventory's first year panel. This first evaluation will be a kind of benchmark concerning the survey design and technology, adjustments will be proposed and implemented for the sake of a smooth performance of the survey in the following years.
174. In year 6 of the project adjustments to the working procedures, the setup of the data collection

technology and variables describing changes and forest dynamics, both at individual plot and tree levels will be required, before re-visiting the plots of the inventory's first year panel in year 7. Furthermore, data of the first five-year long inventory cycle will be analysed in year 7 and results (estimates of target parameters) evaluated with support by international consultants and discussed at the national level with various stakeholders. Regular trainings in field data collection will be delivered by the project before the survey campaign in a given year is launched to maintain common quality standards and instruct field teams for specific measurement situations, they might encounter during field work. Without proper training, quality of data could be seriously compromised and consequently the credibility of results of the forest assessment and monitoring. About 75 participant days (out of the total of 600) are earmarked for these trainings.

175. Building upon the survey design of the 2nd NFI with a grid of sample locations of 4 km by 4 km for both Vojvodina and Central Serbia regions will be used for the field survey. This means that field data are to be collected in about 370 sample locations within forest in Vojvodina and about 8,450 sample locations in Central Serbia. However, for various reasons, but mainly the necessary field checking of the actual land category, the eventual number of sample locations to be visited in the field might reach up to 470. Suggesting a five year long inventory cycle, seven months of field survey in each year of the cycle, a three-person field team (survey leader and two field assistants) and assuming an average performance of 0.6 sample locations per day and field survey team, would result in the need for establishing 2 field survey teams for Vojvodina and 10 for Central Serbia.
176. The main bulk of data analysis and evaluation work of survey data will be done in year 3 of the project (second year of project's inventory cycle when data from the first year panel will be available) and in year 7 (availability of data from the project's first inventory cycle). The complexity of the survey evaluation, the need to design the statistical evaluation methodology in concordance with the data collection methodology and to meet the required quality of monitoring results will require the involvement of the international forest monitoring expert and the Database/IT development and management expert to train, guide, support and build capacities of the five experts from the Institute of Forestry (Database/IT, forestry statistician and publication expert), who will be capacitated to continue the forest assessment and monitoring work in Serbia after the lifetime of the project. A specific training on statistical evaluation of forest inventories will be held in the second year of the first inventory cycle. The results of the first inventory cycle will be presented at the end year 7 during a final NFMA workshop survey results including changes and dynamics (based on measurements in year 7 of the first re-assessed permanent sample plots) will be presented and discussed with policy-makers, authorities, academia, media and the public.
177. Further monitoring work carried out by the Institute of Forestry and ILFE under the project include the assessment of project intervention areas and impact via orthophoto mapping and digital surface models: A CIR (Composite Infrared) orthophoto map and a Digital Surface Model (DSM) will be used to capture the baseline situation, to monitor interventions (afforestation, reforestation, enrichment planting) and to assess the status of the intervention areas at the end of the project. These outputs will require repeated drone-based areal missions in Vojvodina and Central Serbia regions. The overall area covered by orthophoto and DSM shall not exceed 60k hectares (for both regions). It is planned that the orthophoto and DSM will be delivered by the Institute of Forestry in Belgrade in year 1, 3, 5 and 7 of the project (in each mentioned year up to 20k hectares will be covered).
178. Orthophoto maps will have a spatial resolution (pixel size) of 20 cm or less, and minimum positional accuracy (RMSE, Root Mean Squared Error) of 5 meters (horizontal distance) and 10 m (z) or better. At least 15 GCP (Ground Control Points) will be visited for ground truthing purposes in each of the two regions Vojvodina and Central Serbia, during the campaigns in year 1, 3, 5 and 7. The coordinate system will be UTM (Universal Transverse Mercator), file format Geo TIFF (Tagged Image File Format). The map will include red and green visible bands plus the infrared

channel (CIR composite). The positional accuracy, coordinate system and data format of the DSM will be the same as the one of the CIR orthophoto map. The DSM Pixel size will be 0.5 m or smaller.

179. Activity 1.1.2: Develop guidelines for decision makers on LULUCF to prevent soil degradation:

The amount of CO₂ in the atmosphere can be reduced by taking advantage of the fact that atmospheric carbon accumulates in vegetation and soils in terrestrial ecosystems. Under the United Nations Framework Convention on Climate Change (UNFCCC) any process, activity or mechanism which removes a greenhouse gas from the atmosphere is supported and entitled as a sink. Human activities impact on terrestrial sinks through land use, land-use change and forestry activities (LULUCF). The role of LULUCF activities in the mitigation of climate change has long been recognized. Human activities affect changes in carbon stocks between the carbon pools of the terrestrial ecosystem and between the terrestrial ecosystem and the atmosphere. Mitigation can be achieved through activities in the LULUCF sector that increase the removals of greenhouse gases (GHGs) from the atmosphere or decrease emissions by halting the loss of carbon stocks. The project will downscale international policies to the Serbian context and develop guidelines for decision makers regarding LULUCF and prevention of soil degradation.

180. Activity 1.1.3: Create national standard for biomass production / handling for energy purposes:

Bioenergy sustainability standards are developed to provide a basis for assessing the degree to which specific production systems comply with defined criteria. The project will respond to the need of developing a national standard for biomass production, handling and use.

181. Activity 1.1.4: Develop the national strategy, action plan and execution guidelines for Short Rotation Plantations (SRP):

Forests and trees provide not a significant share of the world's energy use, but also for Serbia wood energy is of considerable importance. Most bioenergy currently comes from natural or semi-natural forests or woodlands rather than from forest plantations. However, there is growing recognition that planted woody species are an important means for providing energy. Establishing of plantations may also serve other purposes, such as land rehabilitation and erosion control, watershed protection and production of non-woody forest products. In addition, there is a wide variety of agroforestry, farm forestry or urban systems where trees are planted in non-forest conditions. The current level of production of wood fuel from plantations makes only a small contribution to the energy needs of Serbia, but plantations could be a very important source of wood energy in certain parts of the country. The project will, therefore, develop a National strategy, action plan and execution guidelines for wood energy plantations.

182. Group of Activities 1.2. Technical assistance to upgrade the existing Measurement, Reporting and Verification system and to support the creation of a national offsetting and insetting option:

The recent work under the GCP/SRB/002/GFF project in relation to the 2nd NFI for Serbia in terms of expanding the scope of the NFI by including information relevant to biodiversity and climate change mitigation, will be the point of departure for this project to further refine data information needs and to move towards an integrated Forest Resources Monitoring and Assessment System to meet national as well as international reporting obligations of the Country in relation to the forestry sector within the framework of the national MRV system.

183. The existing carbon monitoring, reporting and verification (MRV) system was reviewed and a proposal for improving the MRV in particular with view to forestry related issue was elaborated

by the GCP/SRB/002/GFF project, however, the suggestions have not yet been reflected in the current MRV system for Serbia.

184. The available MRV is still not up to international standards and very rudimentary in relation to forestry, only taking into account forest areas with assigned C-values, but no forest dynamics included and not covering the whole forest area of Serbia.
185. The project will not only upgrade of the existing MRV system but also establish an offsetting/insetting scheme that will allow the private sector to dispose CO2 for their decarbonization. Together with the establishment of the National Forest Monitoring and Assessment System (NFMA), the development of a national strategy and action plan for wood energy plantations as well as national standard for biomass the project will strengthen the regulatory framework of the forest sector and establish an enabling environment allow the private sector to enter gradually and effectively the decarbonization process.
186. **Activity 1.2.1: Upgrade the national MRV system in relation to forestry:** The project will carry out a detailed assessment of the existing carbon MRV systems as well as revise, update and fine-tune the existing proposal for improvement and will support the MoE in the development and implementation of the MRV system based on international standards and adapted to the Serbian context. The project will assist decision-makers to eventually decide on (i) the institutional setup, (ii) the necessary capacities to be allocated and, (iii) the choice and description of the protocol. The MRV system will be developed in close coordination with the Forest Information System (FIS) established under MAFWM to ensure that the FIS provides the data in the required formats. The process to develop further and validate the MRV system in relation to forestry will not only include an assessment of existing MRV systems in the country, but also consultations with key actors from public, private and academic sectors, as well as civil society. 2 workshops with institutions from the forestry and environmental sectors will be held to validate the revised MRV system by 20 specialists from forestry and environmental sectors.
187. The project will furthermore contribute to the improvement of the MRV by improving the collection and management of carbon related data and information through the new NFMA system established by the project and contributing to the continuous process of improving the FIS, for the sector.
188. **Activity 1.2.2: Develop the national carbon offsetting/insetting mechanism:** The project together with national Banks will define the specific scope of the mechanism which will include afforestation, reforestation, natural regeneration, sustainable forest management, and conversion of degraded coppice stands into high forests. The project will also evaluate, at design, the possibility of including in the offsetting mechanism soil carbon removal as currently being done in other countries by private actors such as INDIGO-AG, NORI, AgriProve, and Verra.
189. **Activity 1.2.3: Make available a regional knowledge-sharing platform for national offsetting/insetting mechanisms and governance:** The project will attract the interest of the private sector in Serbia and possibly neighbouring countries in the national offsetting/insetting mechanisms of Serbia through awareness raising campaigns in various media, accompanied by establishing a digital platform to collect and structure data and information of private sector entities interested in offsetting/insetting carbon emissions of their respective production processes.

| | Group of Activity | Main Counterparts | Scale | Targets |
|--|-------------------|-------------------|-------|---------|
|--|-------------------|-------------------|-------|---------|

| | | | | |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component 2 | 2.1. Upgrade public nurseries to produce climate adaptive seedlings and to increase biodiversity of afforestation and forest restoration investments. | MAFWM Public Forest Enterprises ⁱⁱⁱ Private Nurseries | Vojvodina Central Serbia | <ul style="list-style-type: none"> • 2 public nurseries (Vojvodina/C. Serbia) upgraded and operational, • 200 operators of public and private nurseries supported and trained in the production of diverse and climate adaptive forest seedlings, • 35 million climate adaptive seedlings (local species/varieties) produced by state nurseries. |
| | 2.2. ^{iv} Invest in climate adaptive forest restoration and expansion (community participation, land preparation, planting, and maintenance) ^v . | MAFWM Public Forest Enterprises | National | <ul style="list-style-type: none"> • 7,000 ha of newly established forest (14% of the 2030 target)^{vi}, • 33,000 ha of degraded coppice stands on state owned shifted into high forest (47% of the 2030 target)^{vii}. |
| | 2.3. Technical assistance to mainstream climate adaptive silviculture (CAS) among forest operators | MAFWM Min. of Education Science and Technological Development (MESD) | | <ul style="list-style-type: none"> • 2,500 public (1,700) and private (800) stakeholders are engaged and trained in climate adaptive silviculture • 4 Guidelines on climate adaptive silviculture are produced (nursery production, soil preparation, planting operations and management) • 8 National curricula (faculty of forestry and 5 vocational schools working on forestry, agriculture and accounting) are upgraded with introduced practices and technologies • 1 regional knowledge-sharing platform for CAS in place^{viii}. |

Table 16 Main Activities and Deliverables of project component 2

190. **Group of Activities 2.1. Upgrade public nurseries to produce climate adaptive seedlings and to increase biodiversity of afforestation and forest restoration investments:** The first activity will be to increase the capacity of the existing “Seed Centre and Nursery” of Public Enterprise (PE) Serbia Shume in Pozega (Central Serbia) and the “Ratno ostrvo Nursery” of PE Vojvodina and related Seed Centre in Morovic, Vojvodina to enable the two nurseries identified by the project to produce the necessary seedlings for the envisaged forest restoration interventions under the project. The two before-mentioned nurseries have been chosen to be considered for involvement in the project based on the already existing good basic technical know-how and skills of nursery staff both at managerial and field level as well as the technical infrastructure in place as to minimize the investment cost for upscaling production capacities in the country.
191. In order to afforest at least 7,000 ha of state-owned land and restore at least 33,000 ha degraded forest land as well as to establish planted forest on at least 500 ha of abandoned private lands for energy use, agro-forestry or soil rehabilitation purposes and to establish at least 500 ha of shelterbelts on agricultural lands and restore at least 18,000 ha degraded private forest land, in total around 59,000 ha, the nurseries in Pozega and Ratno ostrvo – in the absence of other larger nurseries in the country - will have to produce at least 33,000,000 container seedlings, at least 1,500,000 bare-root seedlings and at least 500.000 vegetative planting materials (cuttings), mainly poplar and willow cuttings, annually. Apart from five bigger private nurseries with a capacity to grow between 150,000 – 300,000 trees annually, the NGO “Pokret gorana” operates a number of nurseries all over the country, but only the nursery in Subotica has a noteworthy annual production of up to 30,000 seedlings for afforestation activities. The production capacities of these nurseries are just enough to satisfy the local market for horticulture and small-scale planting projects and programmes (roadside plantings, waste disposal sites, mining sites, etc.) with mainly bare-root fruit trees, maple, ash, oak, robinia, poplars and pine species.
192. In 2021 the existing “Seed Centre and Nursery” in Pozega which is the best equipped nursery in Serbia, owned and operated by PE Serbia Shume produced 612,570 out of the total of 4,610,378 bare-root seedlings (mainly coniferous species produced by PE Serbia Shume). The nursery also hosts the national Seed Centre with equipment for seed cleaning and treatment of conifer species

as well as capacities for short and medium-term seed storage. The current production of seedlings in PE Serbia Shume's nurseries is fully used for routine afforestation and reforestation planting activities carried out by the various local branches of PE Serbia Shume and insignificant planting activities of private forest owners. Up to now PE Serbia Shume did not get involved with containerised seedling production of broadleaf species but meets the necessary preconditions to scale up seedling production and to set up container seedling production lines for broadleaf tree and shrub species in order to reach the envisaged annual production of 6,700,000 container seedlings for afforestation and forest restoration interventions with mainly broadleaf species in Central Serbia in the second year of the project.

193. In 2021 the existing "Ratno ostrvo Nursery" of PE Vojvodina in Kovilj which is the biggest and best equipped nursery in Vojvodina region, producing 330,000 bare-root broadleaf seedlings, mainly *Populus* sp. and *Salix* sp., and some smaller amount of *Quercus robur*, *Fraxinus angustifolia* and *Robinia pseudoacacia*. The nursery in Kovilj meets the necessary preconditions to scale up seedling production in order to reach the envisaged annual production of 100,000 vegetative planting materials (cuttings) and about 300,000 genetically superior bare-root seedlings for afforestation and forest restoration interventions in Vojvodina in the second year of the project.
194. **Activity 2.1.1: Upgrade two public nurseries (Vojvodina/C. Serbia):** The project will cover the necessary investments to increase the capacity of the existing Pozega nursery in Central Serbia for the production of container seedlings and scaling up the overall production by adding 3 greenhouses including related infrastructure as well as other equipment for provision of seeds in adequate quantities and qualities for broadleaf species at the premises of the existing nursery site.
195. The infrastructure for the production of container seedlings will include: 3 greenhouses; (fully equipped with irrigation boom, shading, drainage, nutrition, water reservoir), growing area (for container seedlings), metal frames (holding container seedlings), sunshade protection equipment; containers, seed cleaning/sorting equipment for broadleaf species, 1 cold room (20 m²), thermotherapy equipment, 2 irrigation system extensions (outdoor), 1 tractor with equipment; 1 refrigerator; 1 motor cultivator with tiller. Although the project intends to use container seedlings, bare-root seedlings will complement the nursery production at the nursery production site to compensate for accidental loss or damage of the production in a greenhouse (e.g. due to pathogenic fungi).
196. The project will also cover the necessary investments to increase the capacity of the existing Ratno ostrvo nursery and related Seed Centre Morovic in Vojvodina for the production of genetically superior and climate adaptive vegetative and bare-root planting material. This includes 2 greenhouses with solar panels, irrigation equipment, container and frames; one cold storage (cold room fully automatised), one seed treatment line (building and pre-conditioning facilities), as well as extension of outside growing area including infrastructure and necessary equipment including hail protection.
197. As the increased seedling production also requires additional human resources, PE Serbia Shume will hire 6 full-time staff (1 Head of nursery and 1 nursery engineer for each nursery site) and 32 seasonal workers (14 workers for 8 months at each nursery) in order to bring nursery capacities in line with the project's requirements. ILFE will hire additional 6 seasonal workers. The two upgraded nurseries in Pozega and Kać will become operational and start seedling production for project purposes at the beginning of year 2.
198. The project investments in forest nurseries will not only contribute to the production of seedlings and vegetative planting material (cuttings) needed to establish 8,000 ha of new forested areas and restore 51,000 ha of degraded coppice forests, but it will have a long-term objective to ensure a minimum plant production capacity, allowing the Country to achieve its objective of increasing

the country's forest area to 41% by 2050.

199. With the technical support of the same expert in charge of the trainings on “production of diverse and climate-adaptive forest seedlings” (see activity 2.1.1), the production protocols of each selected species will be defined in close collaboration with the Institute of Forestry and ILFE, including guidance for the collection of seeds in the field. In autumn of year 1, PE Serbia Shume staff for Central Serbia and ILFE staff for Vojvodina will gather, train and organize – whenever possible - local workers from the municipalities where the target areas for forest restoration are located to harvest the necessary seeds for the production of seedlings in the nursery. Collection sites are at the disposal of the project through the existing register of seed sources (established in compliance with OECD Scheme for the Control of Forest Reproductive Material Moving in International Trade [33] [34] and for non-registered species, mainly shrub species, the collection sites will be selected and marked by PE Serbia Shume staff for Central Serbia and PE Vojvodina Shume for Vojvodina in areas with healthy plant populations for each of the target species, and workers will follow the seed collection calendars visiting the marked sites when the seeds will be ripe.
200. Once the seeds are transferred to the nurseries, the nursery staff will follow the agreed protocols for the cleaning, extraction and selection of high quality seeds, their storage, and their treatment to facilitate germination throughout the late autumn and winter period. Like for seeds, there will be agreed protocols to be strictly followed by the nursery staff for the handling of cuttings.
201. Seeds are collected in the forest from standing trees of the registered, selected seed stands. The seeds of conifer species are either collected by climbing on the selected trees and picking the cones or during harvesting operations when conifers are felled during the months when seeds are to be collected (November, December), the latter being the currently only used practice throughout Serbia. The seeds of broadleaved species are collected by spreading cloth or canvas under the trees so that the seeds will fall onto them. However, the seeds of ash and maple are to be collected by the same method as conifers.
202. All seeds for PE Serbia Shume’s nurseries are currently collected by the local branches of the enterprise through their local staff and workforce which will receive a refresher training specifically on seed collection methods in the second half of year 1 of the project to ensure sufficient seed supply for the purpose of the project. All cuttings and seeds for seedling production at the ILFE nursery are collected by ILFE staff.
203. In the spring of the year 2, when the seeds will be treated, the production operations will start in the nurseries in order to have 6,600,000 one-year seedlings of the different target species ready to be planted at the end of the same year - from mid-autumn to early winter, as soon as the first rain has moistened enough the soil and before the temperatures are too low.
204. The project will purchase five (5) greenhouses and operate the 5 new greenhouses at full capacity with 2 production cycles per year, i.e. 1,300,000 container seedlings per greenhouse annually to run the seedling production in the most cost-efficient manner.
205. Plant production will continue throughout the following years, based on the plant production protocols, with a total expected production of at least 34,500,000 seedlings and 500,000 cuttings within the lifetime of the project and to meet the peak in demand of 6,8 Mio. seedlings per year (new planting and possible replanting requirements) in year 3 – 6 of the project. The same expert in charge of the above-mentioned trainings in year 1 will provide continuous technical assistance every 2-3 months, to ensure that the nursery staff follow the established protocols in an appropriate way, and to help them resolve unexpected problems that may arise. Technical assistance will be maintained throughout year 2 till year 4 until the nursery staff acquires sufficient expertise to continue autonomously.

206. **Activity 2.1.2: Train and support 200 operators of public and private nurseries in the production of diverse and climate adaptive forest seedlings:** In the second half of year one, the project will organize four training courses of two days each, (two in Kać and two in Pozega nursery) on the production of high-quality plant material (seeds, seedlings and cuttings) to be delivered by the Chamber of Forestry Engineers with support by an international expert hired by the project, to refresh the knowledge of all staff of PE Serbia Shume and ILFE in charge of the nursery works, as well as to train staff and workforce from private nurseries, other forest enterprises (both public and private) and related NGOs to spread the knowledge on up-to-date seedling production methods and technologies and their use beyond the project. The training program will include the following modules with specific information about the selected native species:
- a) Module 1 – High quality plant material: (i) Collection of plant material, including issues such as region of provenance, genetic diversity, collection period, transferring to the nursery, cleaning and seed extraction process; (ii) Seed quality requirements and testing procedures, including issues such as seed viability, purity, weight determination, moisture content, and seed health; (iii) Seed conservation and treatment techniques to break seed dormancy and activate germination; (iv) Seed certification of plant material.
 - b) Module 2 – High quality plant production: (i) Selection and use of suitable containers; (ii) Preparation and use of culture substrates; (iii) Watering for nursery production; (iv) Fertilization techniques; (v) Plant production growth regulators (exclusively organic products); (vi) Mycorrhizal treatment; (vii) Phytosanitary treatments (in accordance with FAO/WHO International Code of Conduct on Pesticide Management (2014)); (viii) Weed management (exclusively organic products); (ix) Sowing and seedling production operations; (x) the production of cuttings; (xi) Hardening treatments to induce mechanisms of drought resistance; (xii) Nutritional hardening.
207. **Group of Activities 2.2. Invest in climate adaptive forest restoration and expansion (community participation, land preparation, planting, and maintenance):** One of the great challenges for forest restoration is establishing young seedlings on sites with a more or less prolonged period of summer drought, as is the case of the target areas in Vojvodina, but also to a large degree in Central Serbia. This is becoming a critical issue as climate change is exacerbating water scarcity and the intensity of drought events in both regions of Serbia. The second group of activities will therefore further develop the capacity of PE Serbia Shume and PE Vojvodina Shume to overcome water constraints and ensure seedlings' survival in the planting operations. The methods that the project will use to ensure the water requirements will include:
- a) Production of drought-tolerant seedlings to optimise water use efficiency;
 - b) Apply effective soil preparation techniques, adequate selection of sites, and adjustment of the planting period to rainfall, to increase water supply;
 - c) Use of mulching and shelters to reduce water losses.
208. FAO and the Government of Serbia have already preliminarily identified and mapped the potential forest restoration and new afforestation sites that are considered suitable for afforestation investment and discussed with stakeholders the potential investment areas (Ref: Annex 7 of the CN submitted to the GCF secretariat in December 2021). The actual suitability and availability of the preliminary identified sites will be verified during the annual planning of planting interventions under the project through the respective planning unit of PE Serbia Shume and PE Vojvodina Shume.
209. Another restoration activity planned under this project will address the issue of degraded coppice forests and how to best manage those forests. Pilot sites where adaptive management measures will be applied and monitored, will be established to provide first-hand experience to staff of PE Serbia Shume and PE Vojvodina Shume, but also private forest owners, on alternatives to

coppicing with the aim to bring back degraded forests into a healthy state, regaining their ecological functions and climate resilience, and thus enhancing human well-being. However, the main activity will be the actual conversion of degraded coppice stands on state owned land into high forest.

210. **Activity 2.2.1: Carry out afforestation activities on 7,000 ha of public land:** For the purpose of the project FAO and the Government of Serbia pre-identified about 20,000 ha of geo-referenced potential areas for planting of seedlings on both state-owned forest land (about 17,400 ha) and underused or abandoned private-owned land (2,600 ha) based on criteria agreed upon within the framework of a LoA between FAO and the Institute of Forestry in Belgrade. The guiding selection criteria for the preliminary identification of potential afforestation areas were: (i) Clear land ownership; (ii) Absence of land tenure conflict; and (iii) Absence of land cultivation or pasture use.
211. In a first step the criteria that have been used for the preliminary identification and mapping of potential afforestation sites, will be reviewed and fine-tuned before making a final decision on each individual site considered for planting. Special emphasis will be placed on the following issues for the selection of the individual afforestation plots:
- a) Ownership of the land clearly defined from a legal point of view (potentially disputed plots excluded).
 - b) Minimum size of the plot at least 10 hectares (preference will be given to largest ones to facilitate both the planting tasks and the monitoring of the results).
 - c) Accessibility of the plot (ensuring access for standard 4x4 vehicles used for transport of seedlings and workers).
 - d) Steepness of the slope (sites with slope average over 30 degrees will be excluded).
 - e) Distance from human settlements (avoiding forestation works in the perimeter surrounding of the most peripheral houses; a buffer zone without forest cover should be maintained to prevent potential forest fire expansion).
 - f) Availability of workforce within 25 km radius.
 - g) Possibility to establish wildlife corridor(s) with newly established forests in Vojvodina region.
212. Concerning ownership, the main source of legal information is the national digital cadaster. The final selection of lands for afforestation activities will be done during project execution with the consent of:
- Concerned land owners or their representatives;
 - Municipalities concerned (e.g. Standing Conference of Towns / Municipalities and National Alliance for Local Economic Development);
 - Civil society and sector's organizations to ensure the absence of legal and customary conflicts as well as to mitigate and mediate when and where necessary. Civil society organizations are also instrumental in ensuring the right inclusion of measures to expand, protect and conserve biodiversity.
213. Afforestation plans for the selected sites will be developed by PE Serbia Shume and PE Vojvodina Shume for state-owned forest land and by the relevant partner for forest investments on lands under private ownership. All forest restoration plans will be prepared with guidance and support of an international expert hired by the project and will include information regarding issues such as:

- a) Site description with information of the ecological and social contexts, including photographs and maps as appropriate.
 - b) Site history, with information of uses, disturbances and underlying causes.
 - c) Justification of the proposed interventions and defining expected results.
 - d) Species selection criteria, based on climate change impacts and adaptation needs (select species with wide ecological range and higher drought resistance, considering the bioclimatic type of each site and projected shifts in potential tree species range limits due to climate change, e.g. avoiding planting seedlings from species in the lower limit of their ecological range; planting seedlings from species somewhat above the upper limit of their ecological range).
 - e) Detailed description of the type of interventions proposed, including the list of selected tree species, proposed planting density, number of seedlings per each species, distributional pattern of seedlings from the different species in the land plot, soil preparation techniques, transferring of seedlings to the field, planting works and techniques, post-restoration maintenance activities, and the timing with very detailed schedule of the different activities.
 - f) Description of the roles and responsibilities for the actors involved, defining the number of days and workers scheduled for each plot (based on best estimate of number of seedlings planted per worker per hour).
 - g) Required equipment.
 - h) Monitoring plan.
214. The international expert will deliver specific training to selected workers who will act as foremen to coordinate the works in each of the selected sites for planting. Prior to the actual planting PE Serbia Shume and PE Vojvodina Shume will organize meetings in the neighbouring communities of the selected restoration sites to present the planned restoration actions, raise awareness about the socio-economic and environmental benefits of forest restoration, and identify people interested in participating in the field works. PEs will seek candidates among local people with previous experience in forestation and who demonstrate a high interest in this work. The selected candidates will participate in a 3-days hands-on training (training of trainers), one organised in Vojvodina and one in Central Serbia, to learn the different planting techniques employed by the project to ensure survival of seedlings in a context of climate change.
215. The participants will use the equipment acquired by the project and the training will focus in particular on: (i) opening the hole (at least 40-50 cm deep and 40 cm wide); (ii) distribution of the holes in the plot (following a "quincunx" pattern or staggered arrangement, as a way to catch the most of the runoff water); (iii) seedling management during planting; (iv) hole protection with mulching - stones and / or chipped wood to avoid evaporation; (v) the construction of micro-catchments on the sides of the hole to increase runoff water uptake. The first training will take place the third quarter of year 2 involving the 50 candidates as foremen for the sites to be restored in year 2. Further trainings will take place on the third quarter of year 3, 4 and 5 to refresh the knowledge acquired and train new foremen (about 40 foremen each year). The trained foremen will become trainers who will provide "learning-by-doing" training to the teams of workers involved in the restoration activities (350 people in total).
216. To develop effective local governance mechanisms for the planning, implementation and monitoring of afforestation interventions on both state-owned and private lands, the project will build on findings and results of the GEF7 Serbia project (GCP/SRB/007/GFF) which started in the beginning of 2022. The project will organize information events in the target municipalities, involving all concerned actors (e.g. local governmental staff, local users and organizations, local staff of PE Serbia Shume and PE Vojvodina Shume), to introduce the project objectives and

proposed actions for improving the forest cover in the municipal land.

217. The project will afforest on average of 1,400 ha of state-owned land every year from year 2 to year 6 of the project and ending planting activities in autumn of year 7 with replacement of dead seedlings on previous year's plantings sites. The planting densities used will be between 2000-3000 depending on the site-specific choice of tree species (an average of 2,500 seedlings/ha has been used for calculation the related annual requirements for seedlings) The proposed planting densities are kept at the lower end of the range recommended by experts for afforestation with broadleaf species, so as to reduce seedling competition for the scarce water resources, especially during the summer drought period, as an adaptive measure to climate change projections. Between 4 to 10 different native species will be used in the same restoration site, with the objective to accelerate the recovery of the ecological process and ecosystems services of the forest and build resilience to climate risks.
218. Species for each restoration plot will be selected based on the species composition of the reference ecosystem (well-preserved forest site in the vicinity of each plot). The percentage of seedlings of the species that in the reference ecosystem dominate the forest canopy, will be between 60-80%, while the percentage of seedlings of accompanying species will be 20-40%. Seedlings from different species will be placed alternately in the planting plots. When conifer seedlings are used, it will be important to combine them with other re-sprouting broadleaved canopy species (e.g. *Pinus* with *Quercus* spp.) with the objective to increase resilience to climate risks, especially forest fires. In case of degraded areas with poor and/or instable soil conditions, 60-80% of the seedlings will belong to pioneer species well-adapted to grow on and fix instable soil (e.g. *Betula* sp., *Pinus* sp., *Robinia* sp.).
219. It is expected that about 19% of the newly afforested areas (260 ha annually) will need to be fenced to prevent impacts from game and to a limited scope also from livestock. In the vast majority of cases existing tractor paths linking the individual afforestation sites may require upgrading and maintenance to ensure year-round access to the restoration sites for monitoring, protection and active management.
220. Considering an average surface of 30 ha per restoration plot, it is expected that the project will restore 47 sites every year (9 in Vojvodina and 38 in Central Serbia), which implies the hiring and organization of 50 teams of 7 workers each, led by a trained foreman. It is estimated that one worker will open 90 holes per day, plant seedlings and add mulch (8 hours of work), corresponding to the planting of 1 hectare with 2,500 seedlings in 2 working days per person (which may be equal to the available days for planting between the first rainfall in autumn that have moistened enough the soil and the arrival of intense winter cold).
221. The international expert who trained the foremen will follow up the planting activities during a 12-day mission during the first year of planting activities together with ILFE for Vojvodina and the Institute of Forestry for Central Serbia, during which he/she will supervise the planting works in at least two sites a day, the follow up on planting activities in year 3 to 6 and assessing the results of planting from previous years will be done by the before-mentioned institutes. The expert will discuss with PE Serbia Shume and PE Vojvodina Shume staff any planting problem and possible solutions and will write reports with recommendations to improve planting operations in the following years.
222. It is expected that planting performance will improve every year, as the workers gain more experience with the practice, and mistakes of previous years will be corrected (including the replacement of workers who do not demonstrate having the necessary qualities and/or interest). On average, the project estimates that at the end of the project the survival rate will be at least 85%. This will entail a progressive improvement of the skills of the planting teams, moving from an estimated survival rate of around 50-60% at the beginning of the project to at least 85% at the end of the project. In order to replace dead seedling and close resultant gaps, it is planned to replant 15% in the year following the planting of the restoration plot.

223. The project will monitor afforestation results through several methods: (i) by establishing permanent monitoring plots in the restored sites, to be assessed by the Directorate of Forests (DoF) twice a year (early spring and early autumn); (ii) through supervision missions of the international expert during the annual planting seasons; and (iii) by analysing satellite images.
224. **Activity 2.2.2: Convert 33,000 ha of degraded coppice stands on public forest land into high forest:** The project will work with the Ministry of Agriculture, Forests and Water Management (MAFW) and the respective PEs to pre-identify at least 33,000 ha of forest stands for project interventions, the majority of which will be degraded coppice stands for conversion into high forest, but also forest stands damaged by abiotic or biotic factors with urgent need of restoring their ecological functioning.
225. The majority of coppice forests in Serbia is about 50-70 years old and characterized by the absence of or limited silvicultural management, thus not making use of the specific forest site's potential in wood production, both in terms of quantity and quality, as well as provision of ecosystem services (e.g. carbon storage). There have been pilot studies by the national research institutions addressing the issue of possible conversion of coppice forests into high forests, however, the actual annual conversion rates continue to remain significantly behind the declared target by the government of conversion of 7,000 ha per year [29].
226. Building on the findings and results of the above-mentioned pilot studies the project will initiate and promote the up-scaling of conversion efforts to meet the targets set by the government to convert at least 7,000 ha per year to satisfy the wood demand at national level in a sustainable manner and to contribute to meeting the CO2 mitigation targets of Serbia laid down in the Draft Low Carbon of Development Strategy with Action Plan (2019) [29]. The project will embrace the concept of a single tree oriented management for the coppice stands selected for conversion which will be accompanied by enrichment planting with different native species with the objective to accelerate the recovery of the ecological process and ecosystems services of those forest stands and build resilience to climate risks.
227. Forest sites will be assigned for thinning operations with the aim to convert with technical support and supervision by the project degraded coppiced forests into high forests in the long term. Routine coppicing activities, i.e. recurring fuelwood cutting, will gradually be replaced by adaptive forest management in state-owned forests, serving both, the fuelwood and the quality timber markets. Adaptive forest management measures will include the following interventions providing climate change adaptation and mitigation benefits:

| Intervention | Adaptation benefits | Mitigation benefits |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Thinning of degraded coppiced forests to convert them into high forests. • Enrichment planting with native species | <ul style="list-style-type: none"> • Thinning in stagnated coppiced forest with high accumulation of dry biomass will help to reduce water stress and competition among trees and increase the growth and health conditions of the remaining trees. • The reduction of dry biomass and improved health conditions of remaining trees help to reduce fire risk. • The effective organization of thinning operations, marketing and use of fuel wood, increases | <ul style="list-style-type: none"> • The lower risk of forest fires and forest dieback in thinned coppiced forests significantly reduce carbon emissions. • Well managed forest stands and organized fuel wood production and marketing reduce the risk of forest degradation drivers causing carbon loss, and improve carbon storage. |

| | | |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | <p>the adaptive capacity of rural communities in the target areas.</p> <ul style="list-style-type: none"> • Well managed forest stands with lower densities facilitate the growth of mushroom species populations and the germination of fruit trees and shrubs providing higher ecosystem services and income generation opportunities. | |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

Table 17 Adaptive forest management measures providing climate change adaptation and mitigation benefits

228. The project will initiate every year from year 2 to year 6 the gradual conversion of state-owned coppice forests into high forest, on average 6,600 ha annually. The planting densities to be expected for enrichment planting will be on average 300 seedlings/ha based on the experiences from above-mentioned pilot studies carried out by research institutions in collaboration with PE Serbia Shume.
229. In a first step PE Serbia Shume and PE Vojvodina Shume will identify and map potential intervention sites, which will be reviewed and fine-tuned by the project before making a final decision on each individual site. Special emphasis will be placed on the following in the final selection process:
- Ensuring that areas of high biodiversity value remain untouched.
 - Ownership of the land clearly defined from a legal point of view (potentially disputed plots excluded).
 - Minimum size of the plot at least 20 hectares (preference will be given to largest ones to facilitate both the planting tasks and the monitoring of the results).
 - Accessibility of the plot (ensuring access for standard 4x4 vehicles used for transport of seedlings, workers and water).
 - Steepness of the slope (sites with slope average over 30 degrees will be excluded).
 - Availability of workforce within a 25 km radius.
230. Land plots that had forest in the near past with a clear need for active restoration interventions (well-preserved deforested areas where there is no natural regeneration, or degraded areas, e.g. after forest fires, with no signs of natural regeneration) may also be considered for re-establishing high forest.
231. The final selection of coppice forest sites suggested by PE Serbia Shume and PE Vojvodina Shume in their respective sphere of responsibility for project intervention will be consulted with the MAFW based on criteria provided by the national and regional Nature Protection Agency to ensure that areas of high biodiversity value remain untouched.
232. Forest intervention plans for the selected coppice forest or damaged forest sites will be prepared by PE Serbia shume and PE Vojvodina Shume in their respective sphere of responsibility. All forest intervention plans will be prepared with guidance and support of an international expert hired by the project and will include information such as:
- Site description with information of the ecological and social contexts, including photographs and maps as appropriate.
 - Site history, with information of uses, disturbances and underlying causes.
 - Justification of the proposed interventions and defining expected results.

- d) Detailed description of the enrichment planting intervention (list of selected tree species, number of seedlings per species, schedule for seedling transfers to the field and planting works).
 - e) Description of the roles and responsibilities for the actors involved, defining the number of days and workers scheduled for each plot (based on best estimate of number of seedlings planted per worker per hour).
 - f) Required equipment.
 - g) Monitoring plan.
233. The detailed planning, monitoring and documentation of forest interventions will provide valuable feedback for further fine-tuning the interventions in coppice forests during and beyond the lifetime of the project.
234. The international expert hired under the project in collaboration with the Institute of Forestry (IoF) in Belgrade, Institute of Lowland Forestry and Environment (ILFE) - Novi Sad, Faculty of Forestry (FoF) - Belgrade, and the Forestry Chamber will deliver specific training on "Climate adaptive silvicultural management of oak and beech coppice forests" to professional staff of PE Serbia Shume and PE Vojvodina Shume who will supervise the forest interventions, as well as selected workers who will act as foremen to coordinate the works in each of the sites of forest interventions.
235. Prior to the actual planting PE Serbia Shume and PE Vojvodina Shume will organize meetings in the neighbouring communities of the selected restoration sites to present the planned restoration actions, raise awareness about the socio-economic and environmental benefits of forest restoration, and identify people interested in participating in the field works. PEs will seek candidates among local people with previous experience in forest operations and who demonstrate a high interest in this work. The selected candidates will participate in a 3-days hands-on training (training of trainers), 2-3 organised in different locations in Central Serbia and one in Vojvodina, to learn about up-to-date forest operation techniques, covering the aspects of safety in harvesting operations, felling techniques, equipment and first aid, but also the different planting techniques employed by the project.
236. In the vast majority of cases existing tractor paths linking the individual restoration sites may require upgrading and maintenance to ensure year-round access to the restoration sites for monitoring, protection and active management.
237. The project will monitor field intervention results through several methods: (i) establishing permanent monitoring plots in the restored coppice sites, to be assessed by DoF staff once a year (early autumn); (ii) through supervision missions of the international expert; and (iii) analysing satellite images.
238. **Group of Activities 2.3. Technical assistance to include climate adaptive silviculture (CAS) among forest operators:** The project addresses key weaknesses of the current forest sector and aims at creating an enabling environment for its sustainable development. Sustainability of the results of the project depend on the improved capacities of forestry professionals, private forest owners and other relevant stakeholder alike, to put sustainable and climate adaptive silviculture into practice for the benefit of Serbia's forests and Serbia as a whole.
239. With climate adaptive silviculture (CAS) the project looks into strategies for climate adaptation by diversifying existing forest communities (species composition, biodiversity, stand structure and spatial heterogeneity) and increasing the share of species that are better suited to future climatic conditions predicted by various models for expected temperature increase scenarios for the different regions in Serbia. Climate adaptation considerations will not only guide the final decision concerning the individual seed stands from where seeds will be collected, but also the subsequent

production of planting materials in nurseries for the project's forest and landscape restoration interventions.

240. **Activity 2.3.1: Train 2,500 stakeholders, both public (1,700) and private (800) in climate adaptive silviculture (CAS):** Through the collaboration with the Ministry of Education, Science and Technological Development of Serbia (MPN), the Forestry High Schools in Kraljevo and Sremska Mitrovica, as well as with the Faculty of Forestry and the Forestry Chamber this activity will particularly contribute to the intended "Capacity strengthening" through establishing a consistent process for professional training and education on climate change-related issues.
241. Through various training activities the project will significantly contribute to improve capacities of professionals and forest workforce, but also other relevant stakeholders, to integrate sustainable and climate adaptive approaches in their daily work, both in planning and implementation. Through the development and formalization of training curricula as well as special attention to involve and empower younger professionals it will be ensured that knowledge remains with the PEs as key responsible agencies in charge of the management of forest resources of Serbia but also in the country as a whole in the longer term.
242. Trainings are scheduled during the implementation of the project to cover the following subjects:
- a) Training on principles of seed /plant material collection for seedling production and handling of seeds after their collection in autumn of year 1.
 - b) Trainings on climate adaptive forest Investments and ecosystem management (2.5 days) for 174 local communities from year 1 to year 4 of the project. The trainings will be performed by Forestry High Schools in Kraljevo and Sremska Mitrovica, the Faculty of Forestry or the Forestry Chamber with support of an international expert hired by the project and form part of before-mentioned Institution's contribution to this project.
 - c) Training courses on forest management approaches and related silvicultural practices, with particular focus on sustainable and climate-adaptive forest management approaches (1.5 days) in 174 local communities from year 1 to year 4 of the project. To minimize workshop cost the trainings will be held back-to-back with the trainings mentioned above under b.
 - d) The training courses on sustainable and climate-adaptive forest management will be complemented by national study tours for private forest/land owner groups from rural communities to demonstration plots established by the respective PE in Vojvodina and Central Serbia regions in 2021 within the framework of the GEF6 forestry project for Serbia. Private sector representatives to participate in the study tours will be selected by MAFWM and the project based on their willingness and commitment to participate in the project's activities under component 2 of this project but also size of forest/land property according to the existing digital cadastre of forests. Priority will be given to single women headed households and in general to women. The project will seek the collaboration of the Chamber of Forestry Engineers and of the National Biomass Association (SERBIO) in planning and implementation of the above-listed training activities.
243. **Activity 2.3.2: Produce four (4) guidelines on climate adaptive silviculture (nursery production, soil preparation, planting operations and management):** The proposed interventions under component 1 and 2 of this project do not only focus on sustainable climate adaptive forestry investments at field level in selected areas of Vojvodina and Central Serbia regions, but also envisage developing four guidelines to support the smooth and swift transition to climate-adaptive silvicultural approaches. The four guidelines will cover the following 1) climate smart nursery production including seed selection; 2) soil preparation for planting on extreme sites; 3)

effective and efficient planting methods; as well as 4) maintenance after planting and first thinning operations.

244. The guidelines prepared by the Institute of Forestry, ILFE and the relevant departments at the University of forestry with support of the international experts hired by the project and direct or indirect involvement of PEs' staff from all over the country will ensure the application of these guidelines in regular forest management planning in Serbia. The project will ensure the transfer of knowledge laid down in the four guidelines through theoretical and on-the-job training, awareness and capacity development for over 600 people in 174 rural communities in the project areas. Additionally, the project will establish collaboration and partnerships through learning tours to countries with similar realities and successful experiences on Forest and Landscape Restoration (FLR) applicable to the Serbian context.
245. These guidelines coupled with the developed capacities of all relevant stakeholder in sustainable and climate adaptive forest management, provides a high potential for scaling-up and replication of proposed interventions beyond the project's intervention areas. In addition, the project will hire a creative communication agency to design and publish user-friendly printed materials (e.g. handbooks, videos and factsheets) targeting practitioners, forest/land owners as well as relevant NGOs. The publications (about 20,000 sets of materials) will be distributed among the 174 municipalities of Serbia, the central and local offices of PEs and concerned ministries, and among project partners. Electronic versions will be also available on the web.
246. The printed materials will be used by PEs' staff to educate new staff as well as guide interested private forest owners in climate-adaptive forest restoration and forest management interventions planned for the years after the end of the project, aiming at fulfilling the government's objectives of increasing the country's forest area to 41% and introducing sustainable forest management practices throughout the country. The project investments in increasing capacity of key stakeholders (e.g. staff of PEs, private forest/land owners, NGOs) such as equipment, high-quality plant material production (high quality seeds and seedlings), and printed materials with implementation guidelines, will ensure long-term sustainability in the pursuit of the national climate change adaptation and mitigation objectives linked to forest restoration, protection and management, as described in the Draft Low-Carbon Development Strategy with Action Plan (2019) [\[29\]](#).
247. **Activity 2.3.3: Upgrade ~~five~~ (4) national curricula (faculty of forestry and ~~five~~ vocational schools working on forestry, agriculture and accounting) with introduced practices and technologies:** The project will involve national institutions to ensure that capacity development needs - identified by the technical experts and initially used to train stakeholders - are addressed. Thus, up-to-date knowledge and skills are transferred not only to staff of PEs, other forestry professionals and workforce already working in the sector, but also to future generation of professional staff working in relevant sectors by revising national curricula related to forestry and forest plant production of the Faculty of Forestry, as well as vocational schools on forestry (Kraljevo and Sremska Mitrovica), on agriculture (26 agricultural high schools) and on financial accounting around Serbia. The new introduced practices and technologies will also be incorporated in advanced trainings for workforce offered by the before-mentioned institutions.
248. Although special attention will be paid already during the implementation of the project to involve and empower younger professionals to ensure that knowledge remains in the Country in the longer term, the agreement with Ministry of Education, Science and Technology Development (MESTD) will further contribute to the sustainability of the project's results, by investing into the future generation to apply sustainable and climate adaptive forest management practices all over Serbia, both in public and private forests.

249. The project expects to ensure that about 3000 students per year will learn about practices and technologies introduced by the project. The activities will also include trainings and capacity development actions for teachers and professors at the above-mentioned institutions to ensure full mainstreaming of the introduced technologies and practices in their teaching modules.

250. **Activity 2.3.4: Facilitate regional knowledge-sharing through a CAS platform:** The project will establish a regional knowledge-sharing platform on CAS approaches used both within this and other relevant projects in Serbia and neighbouring countries.

| | Group of Activities | Main Counterparts | Scale | Targets |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component 3 | 3.1. Supporting and enhancing private sector involvement, contributing to climate resilience of forests and greening of the wood biomass value chain. | MAFWM Chamber of Commerce (Wood and Energy) Chamber of Agriculture Serbia Grain Association | National | <ul style="list-style-type: none"> • 500 ha of abandoned private lands are cultivated with wooden species for energy use, agro-forestry or soil rehabilitation purposes • 50 private actors are engaged in sustainable biomass value chains, • 1 platform involving stakeholders of the forestry and agricultural sector to support a modern and transparent forestry and biomass value chain and facilitate private investments,xi • 500 ha of shelterbelts are established • 18,000 hectares of private coppice stands is shifted to high forest. • Biomass production loans implemented (from Finance in Motion) |
| | 3.2. Technical assistance and capacity development to companiesxii to design climate related investment plans. | Chamber of Commerce IFIs Companies MoEP | | <ul style="list-style-type: none"> • 150 agribusiness and other companies are involved in the process. • 80 agribusiness and other companies produce and start implementation of their respective adaptation and decarbonization strategies, budgets and action plans. • USD 50 million from national and international finance institutions are disbursed to private sector companies to execute their respective climate change plans (including inseting), • 1 platform (new or existing) involving financial institutions and private firms to provide information to firms on enhancing climate resilience of investments, decarbonization investments and enhance financial institution's potential client pool. |
| | 3.3. Technical Assistance to national financial institutions on climate adaptation adhering to international standards on climate risks, such as the new Basel III principles on effectively managing climate-related financial risks, in particular risks related to climate change adaptationxiii | IFIs National Banks Companies (Leveraged Cofinancing) | | <ul style="list-style-type: none"> • Five financial institutions are supported in their capacity to assess climate-related risks in their lending portfolios and support potential clients in activities around climate-change adaptation and mitigation.xiv • Five adaptation/decarbonization service providersxv (e.g. accountants / auditors) are trained, capacitated and operational. |

Table 18 Main Activities and Deliverables of project component 3

251. **Group of Activities 3.1. Supporting and enhancing private sector involvement in reaching national forestry targets and greening of the wood biomass value chain:** Forest restoration under an ecosystem-based adaptation approach is a quite new concept characterized by the complexity of holistically addressing the environmental, social and economic challenges of forest restoration

in a climate change scenario. Very limited experience is still available worldwide in terms of implementation. FAO established the Forest and Landscape Restoration Mechanism (FLR Mechanism) in 2014 to support the global efforts to regain ecological integrity and enhance human well-being through the restoration of the world's deforested and degraded lands (150 million hectares of degraded and deforested landscapes brought into restoration by 2020 and 350 million hectares by 2030 under the Bonn Challenge [\[35\]](#); and 200 million hectares of restored forests by 2030 under the New York Declaration on Forests) [\[36\]](#).

252. Keeping in mind that 49% of forests are under private ownership and the fact that the state-owned areas for afforestation are limited in scale, call for an active involvement of non-state actors to reach the national forestry targets stated in the Draft Low-Carbon Development Strategy with Action Plan (2019) [\[29\]](#).
253. Within the framework of this project the private sector will be involved on a voluntary basis. The project will attract the interest of private forest owners through awareness raising campaigns in various media, accompanied by establishing a digital platform to collect and structure data and information on private forest owners interested in establishing new forests or shelterbelts, or the management of their degraded coppice forests. This will allow to cluster private forest land parcels to reach a minimum scope of five (5) hectares for forest interventions or to plan jointly with interventions in adjacent state-owned coppice forests. Thanks to the digital cadaster, the PEs will ensure direct contact with private forest owners and ensure that women and single women headed households can be prioritized.
254. **Activity 3.1.1: Convert 18,000 hectares of degraded private coppice stands into high forests:** The project will work with the Ministry of Agriculture, Forests and Water Management (MAFWM), the respective PEs and private landowners to pre-identify at least 18,000 ha of forest stands for project interventions, namely to convert degraded coppice stands into high forest.
255. The majority of coppice forests under private-ownership is characterized by abandonment or management activities limited to recurring fuel wood cutting, thus not making use of the specific forest site's potential in wood production, both in terms of quantity and quality, as well as provision of ecosystem services (e.g. carbon storage). There have been attempts in the past by the MAFW DoF and FAO project (2005-2008) and funds have been made available through the "Forest Fund" (administered by DoF) to get private owners interested in the active management of their forest lands. However, attempts failed to bring about a change due to various reasons such as missing data base for reaching out to owners and unfavourable private forest land structure, to name a few.
256. Building on the findings and results of the above-mentioned pilot studies carried out by research institutions in collaboration with PE Serbia Shume in state-owned coppice forests the project aims at mobilising private forests' potential to contribute to meeting the targets set by the government to convert at least 2,117 ha of state-owned and 4094 ha of private-owned coppice forest annually year to satisfy the wood demand at national level in a sustainable manner and to contribute to meeting the CO2 mitigation targets of Serbia laid down in the Draft Low-Carbon Development Strategy with Action Plan (2019) [\[29\]](#). Similar to state-owned forest the project will embrace the concept of a single tree oriented management for the coppice stands selected for conversion, aiming at high forests as the ultimate goal. In this way the private forests will continue to meet the primary needs of private owners without basic knowledge in forestry, namely to produce fuel wood to satisfy their energy needs or to place it on the market. Single tree oriented management and enrichment planting with different native species will not only contribute to the objective to accelerate the recovery of the ecological process and ecosystems services (including carbon storage) of those forest stands and to build resilience to climate risks, but also to create an opportunity to generate income through active management in the short (fuel wood production)

and longer term (fuel wood, marketable timber or NWFPs).

257. Forest sites will be assigned for thinning operations and enrichment planting with the aim to convert - with technical support and supervision by the project - degraded coppiced forests into high forests. Routine coppicing activities, i.e. recurring fuelwood cutting, will gradually be replaced by adaptive forest management (table 17) in private-owned coppice forests, to continuously satisfy the fuelwood demand and create future opportunities for income generation (quality timber or NWFPs).
258. The project will attract the interest of private forest owners through awareness raising campaigns in various media, accompanied by establishing a digital platform to collect and structure data and information on private forest owners interested in the management of their degraded coppice forests. This will allow to cluster private forest land parcels to reach a minimum scope of five (5) ha for forest interventions or to plan jointly with interventions in adjacent state-owned coppice forests.
259. The project will initiate every year from year 2 to year 6 the gradual conversion of on average 3,600 ha of private-owned coppice forests into high forests with planting densities of on average 300 seedlings/ha for enrichment planting.
260. In a first step PE Serbia Shume and PE Vojvodina Shume will confirm and map potential private-owned intervention sites, which will be reviewed and fine-tuned by the project before making a final decision on each individual site. Special emphasis will be placed on the following in the final selection process:
 - a) Ensuring that areas of high biodiversity value remain untouched.
 - b) Ownership of the land clearly defined from a legal point of view (potentially disputed plots excluded).
 - c) Minimum size of the plot at least 5 hectares (preference will be given to largest ones to facilitate both the planting tasks and the monitoring of the results).
 - d) Accessibility of the plot (ensuring access for standard 4x4 vehicles used for transport of seedlings, workers and water).
 - e) Steepness of the slope (sites with slope average over 30 degrees will be excluded).
 - f) Availability of workforce within a 25 km radius.
261. Land plots that had forest in the near past with a clear need for active restoration interventions (well-preserved deforested areas where there is no natural regeneration, or degraded areas, e.g. after forest fires, with no signs of natural regeneration) may also be considered for re-establishing high forest.
262. The final selection of coppice forest sites suggested by PE Serbia Shume and PE Vojvodina Shume in their respective sphere of responsibility for project intervention will be consulted with the MAFW based on criteria provided by the national and regional Nature Protection Agency to ensure that areas of high biodiversity value remain untouched.
263. Forest intervention plans for the selected coppice forest or damaged forest sites will be prepared by PE Srbija Shume and PE Vojvodina Shume in their respective sphere of responsibility for private-owned forests. All forest intervention plans will be prepared with guidance and support of an international expert hired by the project and will include information regarding issues such as:
 - a) Site description with information of the ecological and social contexts, including photographs and maps as appropriate.
 - b) Site history, with information of uses, disturbances and underlying causes.
 - c) Justification of the proposed interventions and defining expected results.

- d) Detailed description of the enrichment planting intervention (list of selected tree species, number of seedlings per species, schedule for seedling transfers to the field and planting works).
- e) Description of the roles and responsibilities for the actors involved, defining the number of days and workers scheduled for each plot (based on best estimate of number of seedlings planted x worker x hour).
- f) Required equipment.
- g) Monitoring plan.

264. The international expert hired under the project in collaboration with IoF, ILFE, FoF and the Forestry Chamber will deliver specific training on “Climate adaptive silvicultural management of oak and beech coppice forests” to PE Serbia Shume and PE Vojvodina Shume’s professional staff who will supervise and select workers who will act as foremen to coordinate the works in each of the selected sites for forest interventions.

265. Prior to the actual planting PE Serbia Shume and PE Vojvodina Shume will organize meetings in the neighbouring communities of the selected restoration sites to present the planned restoration actions, raise awareness about the socio-economic and environmental benefits of forest restoration, and identify people interested in participating in the field works. PEs will seek candidates among local people with previous experience in forestation and who demonstrate a high interest in this work. The selected candidates will participate in a 3-days hands-on training (training of trainers), 10 organised in PE Serbia Shume and one in PE Vojvodina Shume, to learn about up-to-date forest operation techniques, covering the aspects of safety in harvesting operations, felling techniques, equipment and first aid, but also the different planting techniques employed by the project.

266. In the vast majority of cases existing tractor paths linking the individual restoration sites may require upgrading and maintenance to ensure year-round access to the restoration sites for monitoring, protection and active management.

267. The project will monitor field intervention results through several methods: (i) establishing permanent monitoring plots in the restored sites, to be assessed by PEs’ staff twice a year (early spring and early autumn); (ii) through supervision missions of the international expert during the annual planting seasons; (iii) analysing satellite images.

268. **Activity 3.1.2: Rehabilitate abandoned private lands through forestry investments such as short rotation plantations, agro-forestry or soil rehabilitation purposes:** The project will work with the Ministry of Agriculture, Forests and Water Management (MAFW), Regional government’s secretariat responsible for Agricultural Land, the Grain Producers Association, Serbian Chamber of Commerce, private land owners, local communities and other interested partners (e.g. forest research institutions) to identify at least 500 ha of abandoned private lands to be cultivated with wooden species for energy use, agro-forestry, honey production, soil protection or rehabilitation, or a combination of the mentioned purposes.

269. The project will attract the interest of private land owners through awareness raising campaigns in various media, accompanied by establishing a digital platform to collect and structure data and information on private owners interested in an ecologically and economically sound concept for subsequent use of land abandoned due to unfavourable land parcel form and location, degradation (soil salination, mining, etc.) or any other reason. This will allow to cluster private land parcels to reach a minimum scope in terms of area for cultivation with wooden species.

270. Thanks to the digital cadastre, the Secretariat for Agriculture, Forestry and Water Management of

AR Vojvodina will ensure direct contact with private owners of agricultural land and ensure that women and single women headed households can be prioritized.

271. The project does not reinvent the wheel, but rather use and refine already existing guidelines prepared by national experts and institutions for planning, establishing and maintaining different types of energy or forest plantations (Study on establishing intensive forest plantations for energy and other purposes with guidelines for establishing, 2016, Institute of Forestry)
272. The project aims at a share of 10% energy, 60% agro-forestry including honey production and 30% soil rehabilitation sites for cultivation with wooden species (including shrubs).
273. The project will initiate every year from year 2 to year 6 the cultivation of on average 100 ha of abandoned land with wooden species. Based on experiences from leading experts of ILFE the planting densities for energy plantation will be at least 10,000 cuttings/ha based on recent pilot projects using 12,000-15,000 cuttings/ha; and around 1,500 seedlings/ha for agro-forestry plantations as well as soil rehabilitation purposes.
274. In a first step the concerned Municipalities will confirm and map potential intervention sites, which will be reviewed and fine-tuned before making a final decision on each individual site considered for planting. Special emphasis will be placed on the following issues for the selection of the individual afforestation plots:
 - a) Ownership of the land clearly defined from a legal point of view (potentially disputed plots excluded).
 - b) Minimum size of the plot at least five (5) hectares (preference will be given to largest ones to facilitate both the planting tasks and the monitoring of the results).
 - c) Land plots that had forest in the near past with a clear need for active restoration interventions (well-preserved deforested areas where there is no natural regeneration, or degraded areas, e.g. after forest fires, with no signs of natural regeneration).
 - d) Availability of workforce within 25 km radius.
 - e) Possibility to contribute to wildlife corridor(s) with newly established forests in Vojvodina region.
275. Concerning ownership, the main source of legal information is the national digital cadaster. The final selection of lands for afforestation activities will be done during project execution with the consent of:
 - Concerned land owners or their representatives;
 - Municipalities concerned (e.g. Standing Conference of Towns / Municipalities and National Alliance for Local Economic Development);
 - Civil society and sector's organizations to ensure the absence of legal and customary conflicts as well as to mitigate and mediate when and where necessary. Civil society organizations are also instrumental in ensuring the right inclusion of measures to expand, protect and conserve biodiversity.
276. Afforestation plans for the selected sites will be developed by ILFE with guidance and support of an international expert hired by the project and will include information regarding issues such as:
 - a) Site description with information of the ecological and social contexts, including photographs and maps as appropriate.
 - b) Site history, with information of uses, disturbances and underlying causes.
 - c) Justification of the proposed interventions and defining expected results.

- d) Species selection criteria, based on climate change impacts and adaptation needs (select species with wide ecological range and higher drought resistance, considering the bioclimatic type of each site and projected shifts in potential tree species range limits due to climate change).
- e) Detailed description of the type of interventions proposed, including the list of selected tree species, proposed planting density, number of seedlings per each species, distributional pattern of seedlings from the different species in the land plot, soil preparation techniques, transferring of seedlings to the field, planting works and techniques, post-restoration maintenance activities, and the timing with very detailed schedule of the different activities.
- f) Description of the roles and responsibilities for the actors involved, defining the number of days and workers scheduled for each plot (based on best estimate of number of seedlings planted x worker x hour).
- g) Required equipment.
- h) Monitoring plan.

277. The project will monitor afforestation results through several methods: (i) by establishing permanent monitoring plots in the restored sites, to be assessed by the Secretariat for Agriculture, Forestry and Water Management of AR Vojvodina staff twice a year (early spring and early autumn); (ii) through supervision missions of the international expert during the annual planting seasons; and (iii) by analysing satellite images.

278. **Activity 3.1.3: Establish shelterbelts in agricultural landscapes:** The project will work with the Ministry of Agriculture, Forests and Water Management (MAFW), Regional government's secretariat responsible for agricultural land, the Grain Producers Association, Serbian Chamber of Commerce, private land owners, local communities and other interested partners (e.g. forest research institutions) to identify at least 835 km (equivalent to 500 ha) of agricultural lands for the establishment of shelterbelts, mainly in almost tree-less agricultural landscapes of Vojvodina region with the main aim of soil protection (aeolian erosion control) but also to increase biodiversity, provide pollination services as well as (re)establish more suitable habitats and migration routes for wildlife.

279. The project will attract the interest of private agricultural land owners through awareness raising campaigns in various media, accompanied by establishing a digital platform to collect and structure data and information on private agricultural land owners interested in the establishment of shelterbelts with technical and operational support by the project.

280. Thanks to the digital cadastre, the Secretariat for Agriculture, Forestry and Water Management of AR Vojvodina will ensure direct contact with private owners of agricultural land and ensure that women and single women headed households can be prioritized.

281. The project and regional forestry research institutions will support the implementing land owners or local owner groups with the preparation of landscape restoration plans and the approval by the Secretariat for Agriculture, Forestry and Water Management of AR Vojvodina. Support will be provided in particular with the selection of the native species to be planted, and planning the different steps in the shelterbelt establishment process, from the soil preparation to the planting, maintenance and monitoring tasks. The project intervention will closely follow the guidelines established by the Institute of Lowland Forestry and Environment (ILFE).

282. The project will initiate every year from year 2 to year 6 the establishment of an average 167 km

(equivalent to 100 ha) of shelterbelts with tree and shrub species. Based on experiences from leading experts of ILFE the planting densities for shelterbelts will be on average 1,100 seedlings/ha based on recent pilot projects using 300-1,100-seedlings/ha.

283. The selection criteria for the individual area for establishing shelterbelts are the following:
- a) Ownership of the land clearly defined from a legal point of view (potentially disputed plots excluded).
 - b) Minimum size of the individual area for establishing shelterbelts at least 200 hectares.
 - c) Area potentially protected from wind erosion
 - d) Distance from human settlements (avoiding forestation works in the perimeter surrounding of the most peripheral houses).
 - e) Possibility to connect or establish a wildlife corridor in Vojvodina region
284. Following the consensus and agreement of landowners concerned within the respective municipalities to establish shelterbelts, the municipalities will apply to the Secretariat for Agriculture, Forestry and Water Management of AR Vojvodina for the establishment of agricultural protection belts or agroforestry production systems.
285. The project will monitor afforestation results through several methods: (i) by establishing permanent monitoring plots in the restored sites, to be assessed by the Secretariat for Agriculture, Forestry and Water Management of AR Vojvodina staff twice a year (early spring and early autumn); (ii) through supervision missions of the international expert during the annual planting seasons; and (iii) by analysing satellite images.
286. **Activity 3.1.4: Engage private actors in sustainable biomass value chains:** COVERED by Working Paper: Energy Sector – Serbia
287. **Activity 3.1.5: Support a platform involving stakeholders of the forestry and agricultural sector for a modern and transparent forestry and biomass value chain:** The activities will support the creation of a platform, cooperative, or facility involving stakeholders in the sector that will produce and market solid biofuels at standardized high quality for the local population. The platform will have a production line for biomass and also have storage and logistic facilities. It will represent the intermediary to organize local bioenergy value chains between suppliers providing raw biomass resources (that could be also part of the platform) and customers of different scales from private HH up to large heat and power plants. The model has been shown to be very successful in countries like Slovenia, Austria or Germany.
288. The NDA, FAO and involved stakeholders are also assessing the possibility to introduce in Serbia digital platforms (e.g. <https://www.forestsharing.it/>) that will allow forest smallholders to join forces and enhance their plots.
289. **Activity 3.1.6: Biomass production loans implemented:** COVERED by Working Paper: Energy Sector – Serbia
290. **Group of Activities 3.2. Technical assistance and capacity development to companies to design climate related investment plans:** NOT BE COVERED by Working Paper: Forest Sector – Serbia

291. **Group of Activities 3.3. Technical Assistance to national financial institutions on climate adaptation adhering to international standards on climate risks, such as the new Basel III principles on effectively managing climate-related financial risks, in particular risks related to climate change adaptation:** NOT BE COVERED by Working Paper: Forest Sector – Serbia

Cost estimate

292. Underneath is a cost estimate for the activities to achieve the above-mentioned targets. The cost estimates do not consider costs for the Project Management costs. As financing entities are foreseen the GCF, GEF and FAO as well as the Government of the Republic of Serbia.

| <i>Activity</i> | | <i>USD</i> |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|------------------|
| 1.1.1 | <i>Establish the national Forest Monitoring and Assessment System (NFMA)</i> | <i>1,544,535</i> |
| 1.1.2 | <i>Develop guidelines for decision makers on LULUCF to prevent soil degradation</i> | <i>125,850</i> |
| 1.1.3 | <i>Create national standard for biomass production / handling for energy purposes</i> | <i>98,000</i> |
| 1.1.4 | <i>Develop the national strategy, action plan and execution guidelines for Short Rotation Plantations (SRP)</i> | <i>202,650</i> |
| 1.2.1 | <i>Upgrade the national MRV system in relation to forestry</i> | <i>41,460</i> |
| 1.2.2 | <i>Develop the national carbon offsetting/insetting mechanism</i> | <i>1,406,565</i> |
| 1.2.3 | <i>Make available a regional knowledge-sharing platform for national offsetting/insetting mechanisms and governance</i> | <i>49,500.00</i> |

| | | |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 2.1.1 | <i>Upgrade two public nurseries (Vojvodina/C. Serbia)</i> | 4,512,280 |
| 2.1.2 | <i>Train and support 200 operators of public and private nurseries in the production of diverse and climate adaptive forest seedlings</i> | 169,600 |
| 2.2.1 | <i>Carry out afforestation activities on 7,000 ha of public land</i> | 16,787,573 |
| 2.2.2 | <i>Convert 33,000 ha of degraded coppice stands on public forest land into high forest: (cost cover also 3.1.1)</i> | 7,086,150 |
| 2.3.1 | <i>Train 2,500 stakeholders, both public (1,700) and private (800) in climate adaptive silviculture (CAS)</i> | 885,630 |
| 2.3.2 | <i>Produce four (4) guidelines on climate adaptive silviculture (nursery production, soil preparation, planting operations and management)</i> | 25,100 |
| 2.3.3 | <i>Upgrade four (4) national curricula (faculty of forestry and five vocational schools working on forestry, agriculture and accounting) with introduced practices and technologies</i> | 39,000 |
| 2.3.4 | <i>Facilitate regional knowledge-sharing through a CAS platform</i> | 17,250 |
| 3.1.1 | <i>Convert 18,000 hectares of degraded private coppice stands into high forests</i> | <i>Related cost included under 2.2.2</i> |
| 3.1.2 | <i>Rehabilitate abandoned private lands through forestry investments such as short rotation plantations, agro-forestry or soil rehabilitation purposes</i> | 5,519,000 |
| 3.1.3 | <i>Establish shelterbelts in agricultural landscapes</i> | 1,121,633 |
| | TOTAL: | 32,342,463.00 |

Table 19 Estimate of cost for forestry-related project activities

Timeframe

10.2 Institutional Aspects/partners and Implementation Arrangements

293. FAO will be the accredited entity of the project and will co-execute activities with the MAFWM. The EBRD will provide technical support and parallel financing. The project will be executed through a project management unit to support all the technical activities. The Project Management Unit will work under the guidance of a Project Steering Committee (PSC) representing the line ministries and other stakeholders including representatives of the private sector.

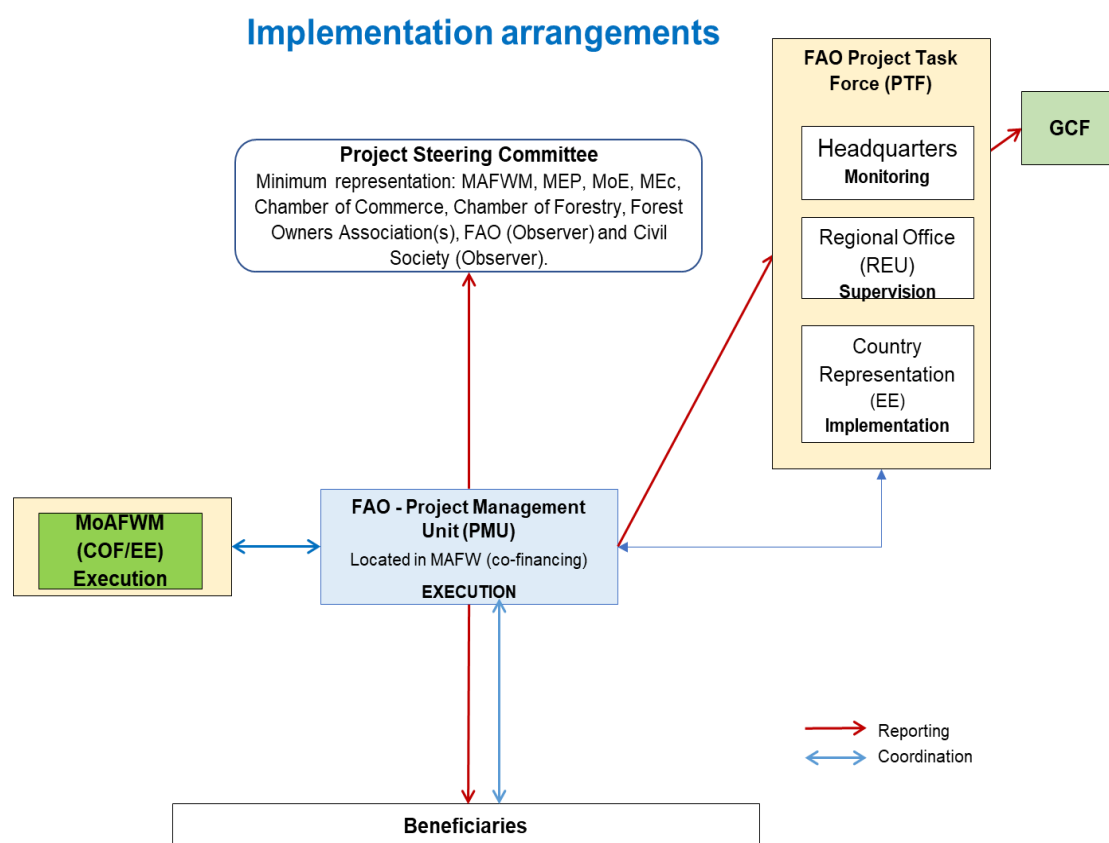


Figure 3 Project's implementation arrangements

294. To ensure national engagement and strategic positioning, the project will also partner with both governmental (Ministries and Municipalities) and non-governmental partners (Chambers of Commerce and Industry; Forestry, Agriculture and other category organizations). Partnering institutions and organizations reflect the various dimensions of the projects. Each will have a specific role in ensuring the success and sustainability of planned activities.

| Institution | Description |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ministry of Agriculture, Forestry and Water Management (MAFWM) EXECUTING ENTITY | As NDA as well as Responsible for developing and implementing policies in the field of agriculture, forestry and water management. The project will mainly work with the Directorate of Forests on all forestry-related issues, but in particular on FLR matters, with support and involvement of Agricultural Land Directorate, Rural Development Directorate, and other Directorates as appropriate. |

| | |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ministry of Environmental Protection (MEP) | Responsible for development and maintenance of the system for protection and improvement of environment. The project will work with the MEP as the main partner for the establishment of the offsetting / inseting mechanism and in the activities related to the decarbonization process. |
| Ministry of Mining and Energy (MME) | Responsible for increasing energy efficiency and energy security. The project will work with the MoE in greening the fuel biomass value chains and other activities related to the decarbonization process. |
| Ministry of Education, Science and Technological Development (MESTD) | Responsible for the national education system. The project will work with the MESTD as main partner for the upgrade of the national universities' and vocational schools' curricula that are relevant for the practices, technologies and methodologies introduced by the project. |
| Ministry of Economy (MoE) | Responsible for elaborating the national economic, trade and industrial development policies and the strategies of economic security and sustainable development. The project will work with the MoE to engage the private sector in both forestry and decarbonization activities. |
| PE Serbia Shume and PE Vojvodina shume | Responsible for managing state-owned forests, and for professional affairs and supervision in private forests. The project will work with the PEs in the planning and implementation of afforestation and restoration activities of the project and the roll-out of the newly introduced CAS to become integral part of SFM. |
| Municipalities | Municipalities are in charge of municipal lands (including insignificant forest area in a very limited number of municipalities) within the borders of their territory. The project will work with municipalities to explore opportunities for FLR investments on degraded lands applying the newly introduced CAS approaches. |
| Chamber of Forestry | The project will work with the chamber on Forestry on further training of forest professionals to ensure that the newly introduced CAS approaches are applied in their day-to-day work |
| Chamber of Commerce and Industry / Serbia Grain producers' association | The project will work with the chamber and with the Serbia grain producers' association to identify private sector actors and to engage them in the forestry/decarbonization activities. |
| The National Biomass Association SerBio | SerBio is an association of NGO's, companies and individuals in the field of biomass utilization and can facilitate interactions with various stakeholders in relation to biomass mobilization and utilization. |
| National and local NGOs | Environmental NGOs at national level, like the Forestry Youth Movement (Pokret gorana) as well as at local level are active in educating young people and having field activities such as tree planting on a smaller scale. The project will try to involve them in FLR activities, thus sharing knowledge about the newly introduced CAS approaches with a wider audience and contributing to achieve sustainability of the results of the project. |

Table 20 Role of the main institutional stakeholders

295. FAO has extensive experience in supporting countries in the field of climate change adaptation and mitigation, as well as climate adaptive silviculture. Furthermore, having under implementation more than 138 climate and resilience projects worth over USD 600 million, the organization has the experience and technical capacity to manage the requested grant and to properly support Serbia in the forest sector and decarbonization processes. In Serbia, FAO has been operational since 2001 in various areas, including in sustainable forest management, biodiversity and wildlife protection, sustainable management of natural resources, land degradation, disaster risk reduction and climate change adaptation. Activities include the capacity development of national institutions, NGOs, associations, companies and farmers as well as the formulation of investments in forestry (forest assessment, forest and landscape restoration, and afforestation) and policy assessment. Examples of recently implemented or ongoing projects in Serbia include:

- FAO/GCF (Readiness)/ National Designated Authority (NDA): increasing national capacities to accelerate climate related investments, with focus on engagement of private sector.
- FAO/ MAFWM/ MEP: support to Serbia sustainable forest management including forest assessment, close-to-nature forestry, climate change mainstreaming.
- FAO/EU/MAFWM: building climate change resilience in the agricultural sector with focus on increasing institutional capacities in the context of EU chapter 27.
- FAO/Hungary/MAFWM/ MEP: supporting the development of organic agriculture in the country. FAO/MEP: developing a national report on land degradation for submission to the United Nations Convention to Combat Desertification (UNCCD).

- FAO/MAFWM: comprehensive assessment on vulnerabilities to climate change impact of all municipalities in Serbia, identifying the root causes of vulnerabilities. In parallel, FAO provides direct support to local governments in improving their resilience to climate change impacts and address issues in the field of forestry and disaster risk management.

10.3 Expected Benefits

Mitigation

296. The activities under outcome 2 are foreseen to have significant mitigation effects. The planned forest restoration interventions on 7,300 ha in the project areas are expected to sequester 12,961 kt CO₂-e (20Y). Furthermore, there will be benefits in both carbon sequestration and reduced emissions through the various training, capacity development and awareness raising activities of the project and through the engagement of private forest/land owners in sustainable and climate adaptive management of forests that can at this point in time not be quantified.

Adaptation

297. The project will improve resilience of forest ecosystems and ecosystem services and mitigate negative impacts of climate change by introducing climate adaptive silviculture practices in the areas of forest and landscape restoration interventions (64,300 ha) and empowering at least 400 people from PEs Serbia Shume, PE Vojvodina Shume and National Park "Fruška Gora", local authorities, the private sector and the civil society to adopt CAS practices throughout the country. The increased capacities, in particular of PEs' staff, for applying CAS as means for advancing sustainable forest management in the country, ensure the sustainability of results. In this context special, attention will be paid to involve and empower younger professionals to ensure that knowledge remains with PEs in the longer term.

Environment (i.e. biodiversity, ecosystem services)

298. In addition to the presented impacts in terms of CCM and CCA, the project will also have positive impacts on biodiversity and the provision of ecosystem services, such as on air quality (removal of air pollution by the interception of particulate matter and the absorption of gaseous pollutants, lower incidents of forest fires), on soil and water quality (reduced incidents of soil erosion both in forests and forest adjacent lands). More diverse species composition and better structured forests also improve the quality of habitats for wildlife and wildlife migration. Furthermore, the project will contribute to SDG 6 [6] - 12 [2] -13 [1,3] - 15 [1,2,3,4,9,A-B]).

Economic

299. Through the envisaged forest restoration interventions the project will positively contribute to the improvement of incomes of the rural poor by involving people, in particular women and unemployed people, from communities adjacent to sites of intervention in all forest restoration activities. Temporary employment will not be the only benefit the involved communities' residents, the continuous trainings received and experience gained during the project implementation will help them to find jobs in the forestry sector in the future, thus contributing to the local economy. Additionally, the project thanks to its investments in forestry as well as in increasing local governance of forests and other natural resources will increase the number of job opportunities

in rural areas transforming forests and other ecosystems from exploitable resources to investments of national relevance. (Contribution to SDG 12 [2])

Social

300. Addressing forest governance issues at the at all levels, in particular involving rural women as actors and promoters of change, will have major impacts on women condition (reducing their direct vulnerability to Climate Change) in particular through forest restoration interventions on abandoned agricultural lands. A higher share of planted tree species which offer NWFP, will be of benefit for women as they are traditionally more involved in the collection and processing of NWFP, thus creating income opportunities for rural women. Furthermore, women will be involved with a leading role in communities and will be empowered to lead the new green growth opportunity of rural communities stimulated by the project. (Contribution to SDG 7 [2]).

10.4 Monitoring and Evaluation (please provide smart indicators and means of verification)

Baseline, Midterm Targets, Final Targets

Increase the annual seedling production capacity at national level

Indicator: 34.5 Mio container seedlings and 0.5 Mio cuttings in excess of baseline production

Baseline: annual production of 5.1 Mio bare-root seedlings and 1.9 Mio cuttings

Mid-Term target: production capacity of 17.4 Mio container seedlings and 2.2 Mio cuttings

Final target: additional production capacity of 34.7 Mio container seedlings 2.4 Mio cuttings

Technical update of experts

Indicator: Topic “sustainable and climate adaptive silviculture” becomes mandatory training for technical experts and workforce of PEs as well as DoF

Baseline: No professional further training programme available

Mid-Term target: development of training packages and training of at least 600 people

Final target: development of training packages and training of at least 2,500 people

Introduction of climate adaptive silviculture (CAS)

Indicator: Development of 4 guidelines on specific subjects of CAS (nursery production, soil preparation, planting operations and management)

Baseline: Guideline documents developed under GCP/SRB/002/GFF partly addressing some CAS aspects

Mid-Term target: Developed guidelines officially endorsed by DoF and applied in forest management planning by PEs

Final target: Developed guidelines are essential element in education and training of future professionals and workforce programmes, as well as integral element of all forest management and restoration activities

Forest assessment and monitoring system (NFMA)

Indicator: NFMA developed and established, first inventory cycle completed

Baseline: scattered forest assessment and monitoring activities

Mid-Term target: NFMA developed and officially accepted by MoNP

Final target: NFMA established and results used for evidence-based policy making

Proposed SMART Indicators;

Adherence with GCF performance monitoring framework;

301. The following table present an overview of indicators adhering to the GCF performance framework related to the current foreseen main activities described in this document. More details and updates will be provided during the detailed design mission.

| Expected Result | Indicator | Means of Verification (Move) | Baseline | Target | | Assumptions |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Mid-term (if applicable) | Final | |
| Fund-level impacts | | | | | | |
| M 4.0 Reduced emissions from land use, deforestation, forest degradation, and through sustainable management of forests and conservation and enhancement of forest carbon stocks | 4.1 Tonnes of carbon dioxide equivalent (t CO2eq) reduced or avoided (including increased removals) as a result of Fund-funded projects/programmes – <i>forest and land-use sub-indicator</i> <i>(Social, environmental, economic co-benefit index/indicator at impact level)</i> | FAO EX-ACT and/or NEXT informed by annual reports from the MAFWM - Directorate of Forestry (DoF) (based on NFMA results) and presented according to CIF FIP theme 1.1 Ministry of Environmental Protection (MEP) Biannual Update to UNFCCC Project Reports | Carbon removals from the forest subsector in 2015 (t CO2eq): -4.533 kt | Carbon removals from the forest subsector (CO2eq): -6,219 kt CO2-e | Carbon removals from the forest subsector (CO2eq): -12,961 kt CO2-e | Absence of major natural disasters including forest fires in the country. No major changes in utilization of forest resources. State budget allocated to fulfill NDCs is guaranteed during and after the project. CAS is progressively implemented / applied in state-owned and private forests. The economic, social and political context in the country remains stable. |
| M 9.0 Improved management of land or forest areas contributing to emissions reductions | 9.1 Hectares of land or forests under improved and effective management that contributes to CO2 emission reductions | Official statistics and report from the MAFW - Directorate of Forestry (DoF) IoF and ILFE via repeated assessment of the situation of the intervention areas by field inspections + aerial imagery (high resolution orthophoto maps and surface models) acquired by drones in year 1, 3, 5 and 7. | 0 | 276,150 ha of forests | 552,300 ha of forests | Absence of major natural disasters including forest fires in the country. State budget allocated to fulfill NDCs is guaranteed during and after the project. CAS is progressively implemented / applied in state-owned and private forests. |

| | | | | | | |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | The economic, social and political context in the country remains stable. |
| A 4.0 Improved resilience of ecosystems and ecosystem services | <p>4.1 Coverage/scale of ecosystems protected and strengthened in response to climate variability and change</p> <p>4.2 Value (US\$) of ecosystem services generated or protected in response to climate</p> | <p>Official statistics and report from the MAFWM - Directorate of Forestry (DoF)</p> <p>IoF and ILFE via repeated assessment of the situation of the intervention areas by field inspections + aerial imagery (high resolution orthophoto maps and surface models) acquired by drones in year 1, 3, 5 and 7.</p> | 0 | 276,150 ha of forests | 552,300 ha of forests | <p>Absence of major natural disasters including forest fires in the country.</p> <p>State budget allocated to fulfill NDCs is guaranteed during and after the project.</p> <p>CAS is progressively implemented / applied in state-owned and private forests.</p> <p>The economic, social and political context in the country remains stable.</p> |

Table 21 GCF performance monitoring framework

Adherence with Sustainable Development Goals

| PROJECT's CONTRIBUTIONS TO SDGs | | | | |
|---------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SDG # | SDG | Targets | Indicators | Project's Direct Contributions |
| 7 | Ensure access to affordable, reliable, sustainable and modern energy for all | " 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix " | 7.2.1 Renewable energy share in the total final energy consumption | The project aims at diversifying renewable energy use and making biomass energy use more sustainable. At the moment wood energy production in Serbia is at its limit as the rate of utilization (95% in 2022) is close to the annual growth of forests in the country. The project aims at reversing this situation and seeks furthermore synergies with other projects to engage communities in forest governance and management to reduce the pressure on forest resources to satisfy the fuel wood demand. |
| 12 | Ensure sustainable consumption and production patterns | 12.2 By 2030, achieve the sustainable management and efficient use of natural resources | 12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material | The resources used by the rural population for heating with wood energy are entirely domestic products. It is the aim of the project to transform the current BAU into a situation where domestic forest resources become modern, profitable and sustainable sources of renewable energy. |

| | | | | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | consumption per GDP | |
| 13 | Take urgent action to combat climate change and its impacts | 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries | 13.1.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people | Holistic management practices of the project will lead to a healthier forests that are more resilient to impacts of climate change and natural disasters like fires, floods, landslide etc. and mitigate therefore also risks for humans |
| | | 13.3 Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning | 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions | Through various activities the project will significantly contribute to improve capacities of professionals and forest workforce, but also other relevant stakeholders, to integrate CAS approaches in their daily work, both in planning and implementation of sustainable forest management activities. |
| 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: | 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and dry lands, in line with obligations under international agreements | 15.1.1 Forest area as a proportion of total land area | Activities of the second component aim at establishing 10,000 ha of new forests, cultivating 2,000 ha of abandoned private lands with wooden species and converting 1,000 ha of agricultural land into shelterbelts, which will directly contribute to increase forest areas as a proportion of total land area towards the target of the government to reach 41% forest cover by 2050. |
| | | 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally | 15.2.1 Progress towards sustainable forest management | The project will develop guidelines on climate adaptive silviculture and promote their use at all levels to ensure that sustainable and climate adaptive forest management practices will be introduced throughout Serbia. The project will also introduce to Serbia the necessary tools (NFMA) to monitor the progress towards sustainable forest management. |
| | | 15.3 By 2030, combat desertification, restore degraded land and soil, | 15.3.1 Proportion of land that is degraded over total land area | Activities under component 2 aim at restoration of degraded forest and land through adoption of sustainable and climate adaptive forest management practices. In particular, the project will restore 24,000 ha |

| | | including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world | | of degraded state-owned coppice and 18,300 hectares of private coppice forest to ensure a wider range of forest ecosystem services and improve carbon storage. |
|-------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts | 15.9.1 Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020 | All the activities aim at protecting forest resources, restoring degraded or establishing new species-rich mixed forests, and have therefore a positive effect on biodiversity |
| | | 15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems | 15.A.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems" | The project mobilizes significant public resources for integrated management of natural resources. |
| | | 15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation | 15.B.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems | The approach is to consider forestry resources from a holistic perspective. It is therefore intended to provide integrative management approaches for the forest providing services for the conservation of biodiversity, risk mitigation and as a source for sustainable energy. The Energy Action plans will address all these aspects to allow sustainable management of forest resources on a local level. |
| ADDITIONAL CONTRIBUTION | | | | |
| SDG # | SDG | Targets | Indicators | Project Indirect Contributions |
| 6 | Ensure availability and sustainable management of water and sanitation for all | 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes | 6.6.1 Change in the extent of water-related ecosystems over time | Reduction of forest degradation drivers through this component will have a positive effect on forest management and therefore also water-related ecosystems |

Table 22 Contribution to Sustainable Development Goals

Means of Verification;

302. The project will apply FAO's standard M&E and Knowledge Management (KM) procedures and will focus on geo-referencing and remote sensing of project activities at field level. These procedures will allow not only to clearly understand the context of the project interventions and therefore improve the reporting, but also to attribute a clear spatial dimension to project investments and beneficiaries' distribution.
303. During the consultation meetings with the various project partners in 2021 and spring 2022 it was agreed that all: (i) each activity will be geo-referenced, (ii) that GIS based maps will be provided for each investment, (iii) that remote sensing and ground truthing are the privileged tools of monitoring, and (iv) the Institute of Forestry (Belgrade) and ILFE will be involved in the process.
304. Geo-referencing activities will strengthen the national engagement process and the Country's ownership allowing stakeholders, as well as donors in Serbia and elsewhere, to have transparency and an enhanced participation in the project.
305. For this purpose, the project will elaborate a shared spatial database, accessible via Google Earth, addressing identified indicators and other important analysis, in order to have a timely update about the achievement of targets of the project, utilizing satellite images. FAO has already developed a specific application supporting the entire project cycle and also impact evaluation. Independent evaluators will furthermore deliver the main basis for the continuous verification processes and for the midterm and final evaluations.

Human and financial resources needed for M&E

306. In order to facilitate the project's implementation and achieving of agreed project objectives, it is recommended that the Executing Entity shall make available one person dedicated to Monitoring and Evaluation with understanding of GIS and Renewable Energy / Energy Efficiency technology, available to the project. This specialist will be supported by independent evaluation service providers.

10.5 Risks and Mitigation related to the sector and proposed interventions

| Selected Risk Factor 1 | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|
| Category | Probability | Impact |
| Technical and operational | Medium | Low |
| Description | | |
| Resistance to Change: Administration, municipalities and private land owners as well as <i>companies and agribusiness</i> will require time and incentives to shift from the BAU scenario to a low emission sustainable development. In the past decades forests have been considered a mining resource and the shift to a new governance will require transparency and clear engagement of all stakeholders including the private sector and civil society as a whole. | | |
| Mitigation Measure(s) | | |
| <ul style="list-style-type: none"> - The project will invest in awareness and education always approaching investments and beneficiaries with an evidence based approach and replicating good practices from the Country, the Region and from similar contexts. Additionally, the project will work within the framework of existing laws such as law on Law on Forests, Law on Agricultural Land, Law on Use of Renewable Energy Sources and others. - As agreed in the national engagement process, concerned state actors will be involved in the whole project cycle process including monitoring and evaluation of executed activities. - The project will be the vehicle for new forest and landscape restoration approached as well as for a | | |

| | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|
| <p>involving the private sector at a larger scale in reaching national forestry targets and greening of the wood biomass value chain. Women groups that have already being mobilized via key representatives of the Serbian Civil Society that are actively participating in the national engagement process, will provide a further impetus to this end.</p> <ul style="list-style-type: none"> - The project will create the enabling conditions for the private sector to effectively and efficiently engage in the country's decarbonization process through adaptation and mitigation investments reach rural areas with. - Besides working with the State authorities at the national and the local levels, the Project will develop strong and active cooperation with local elected bodies (i.e. Municipalities) as well as with the communities where project investments will take place, and the civil society. | | |
| Selected Risk Factor 2 | | |
| Category | Probability | Impact |
| Technical and operational | Low | Low |
| Description | | |
| Ineffective National Secure Measuring and Reporting and Verification (MRV). The Country is still improving and tuning its MRV system and which is not fully tailored to forest-related activities. Due to budget constraints and lack of adequate capacities in the line ministries, the process is not yet fully established and functional. | | |
| Mitigation Measure(s) | | |
| FAO is already investing in securing a precise baseline. The Organization is as well supporting the Institute of Forestry in acquiring the needed technologies, skills and resources to ensure effective and efficient measuring, monitoring and verification. | | |
| Selected Risk Factor 3 | | |
| Category | Probability | Impact |
| Technical and operational | Low | low |
| Description | | |
| Directorate of Forests does not endorse the Climate Adaptive Silviculture (CAS) guidelines and CAS is not included in the national procedures for forest management. | | |
| Mitigation Measure(s) | | |
| FAO has involved all relevant stakeholders in the elaboration process of the guidelines and established a close relationship with the Directorate of Forests as well as the PEs Serbia Shume and Vojvodina Shume, the main responsible entities for managing state-owned and supervising private forests and forest lands at field level. The project will maintain this close relationship and ensure that all partners are informed in a transparent and timely manner. | | |
| Selected Risk Factor 4 | | |
| Category | Probability | Impact |
| Technical and operational | Medium | high |
| Description | | |
| Required output of high-quality seedlings cannot be delivered in a given year | | |
| Mitigation Measure(s) | | |
| Although the project intends to solely use container seedlings for all other than vegetative propagated species (poplar species, shrubs), bare-root seedlings will complement the nursery production at all three nursery production sites to compensate for accidental loss or damage of the production in a greenhouse (e.g. due to | | |

pathogenic fungi). In addition, technical assistance will be maintained throughout year 2 till year 4 until staff of all three nurseries has acquired sufficient expertise to continue high-quality seedling production autonomously.

10.6 Sustainability (environmental, economic and social)

307. The Project addresses key weaknesses of the current forest sector and aims at creating an enabling environment for its sustainable development. Sustainability and replicability of the project will be ensured by the followings: (i) Upgraded nurseries are fully operational and staff of Požega and Ratno ostrvo nurseries capacitated to produce high quality, climate adaptive seedlings in the required quantities to continue restoration activities on the same scale as the project; (ii) The use of climate adaptive practices introduced by the project will reduce the cost of maintenance of forests while increasing the resilience of forest ecosystems; (iii) Introduced practices constitute a technical upgrade of existing practices with no changes in budget requirements or workforce needs; iv) Introduced practices will increase the capacity of stakeholders to manage forests in a sustainable and climate adaptive manner; v) Enhanced participation of communities and the private sector in forest governance creates “ownership” and interest in the planning, implementation and monitoring of forest and landscape restoration interventions on municipal and private lands. While in execution as well as after completion the restoration interventions the achieved results will be monitored by the involvement of all national and local stakeholders.
308. Additionally, thanks to the agreement with the Ministry of Education, Science and Technological Development (MESTD and its vocational and training schools, transfer of practices and technologies are ensured after the project as these will become regular elements of the national curricula related to energy efficiency, biomass production and forestry.

11) Conclusions

309. Collaboration with countries in the region with successful experiences in the production of drought-resistance seedlings for climate change adaptation from similar type of species (e.g. Lebanon), in the management of forest health issues in similar type of broadleaf forests (e.g. Iran) and with international organizations and networks dealing with climate induced changes in forest ecosystems (e.g. Forest Invasive Species Network for Europe and Central Asia) should be actively sought to bring the best available knowledge from the region to Armenia.
310. The experience from countries from all over world indicates that community involvement should also become a greater priority in strengthening the management of local natural resources in Armenia. There have been a number of projects with an attempt to provide communities a voice on forest governance and management issues, and their past experiences are a valuable asset when developing local governance mechanism. The table below presents a list of projects for coordination and possible collaboration

12) References

| # | Reference |
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| | |
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13) Annexes

Annex 1 - List of projects in the field of environment supported by Provincial Secretariats in Vojvodina

Annex 2 – List of co-financing projects supported by the Provincial Secretariat for Finance in 2021

Annex 3 - Adherence with GCF investment Criteria

Annex 4 - Adherence with Relevant National Policies

Annex 5 - Adherence with Relevant National Laws and Regulations

Annex 1

Provincial Secretariat for Urbanism and Environmental Protection

EU projects

„Support to allergen free environment“ (HUSRB/1002/122/195 SAFE)

„Agriculture in cooperation with nature“ (HRSRB CHAIN)

Eionet-Srbija - Capacity Building Project of the Environmental Protection Agency of the Republic of Serbia (SEPA)

Domestic projects

„For cleaner and greener schools in Vojvodina“

Provincial Secretariat for Regional Development, Interregional Cooperation and Local Government

Strategic projects

Interreg-IPA cross border program Romania-Serbia 2014-2020 (13,8 million €):

„Revitalization of the navigation infrastructure of the Begej canal“

Interreg-IPA cross border program Hungary-Serbia 2014-2020 (29 million €):

„Colorful cooperation“

Partners: PS for Regional Development, Interregional Cooperation and Local Government, City Novi Sad, City Subotica

„Complex improvement of water management areas of the Baja-Bezdan canal“

Partners: PE Vode Vojvodine (Water of Vojvodina), European Affairs Fund

„Dream railway“

Partners: PS for energy, construction and transport

„Water supply and development of water infrastructure in border catchment areas“

Partners: PS for Agriculture, Water Management and Forestry, Municipality Kanjiža

„Development of the Kibekhaza-Rabe road border crossing“

Partners: PE Putevi Srbije (Roads of Serbia), Institute for Urbanism of Vojvodina

Interreg-IPA cross border program Croatia–Serbia 2014-2020 (8,1 million €):

„Tourism development in the Central Danube Region“

Partners: PS for Regional Development, Interregional Cooperation and Local Government

„Improving trade potential in the cross border region“

Partners: Agency for Regional Development of Vojvodina, Employers' Union of APV

„Common wine story of the Fruška Gora region“

Partners: Agency for Regional Development of Vojvodina

„Exploitation of different energy sources for green energy production – X DEGREE“

Partners: Fond Evropski poslovi

„Borba protiv ambrozije ekološki i efikasno – FREE“

Partners: European Affairs Fund

„Virtual and cultural tourism – VICTOUR“

Partners: European Affairs Fund

„Encouragement of the development of an environment for children without air pollution – SAPFEC“

Partners: European Affairs Fund

„Mosquito control in the cross border area – MOS-Cross“

Partners: European Affairs Fund

„Cross border network for innovative laboratories – CBNolL“

Partners: European Affairs Fund

INTERREG Adriatic-Ionian program of transnational cooperation 2014-2020 (2,7 million €):

„Evaluation of small agricultural systems in the area covered by the ADRION program and strengthening the innovative spirit of family SMEs“

Partners: Agency for Regional Development of Vojvodina

„Development of a common brand for sustainable and competitive tourism in the ADRION macro region“

Partners: Agency for Regional Development of Vojvodina

Projects in the implementation phase in the total amount of 1.098.714 €:

„Disaster reduction, standardized hazard analysis and risk assessment - DR SHARE“

Partners: PS for Regional Development, Interregional Cooperation and Local Government, European Affairs Fund

„Response to present emergencies in the cross border area - EMBER“

Partners: PS for Regional Development, Interregional Cooperation and Local Government, European Affairs Fund

„Antenna Desk Creative Europe“

Partners: European Affairs Fund

EU projects underway

„Enhancing the tourism development in the Central Danube cross border region“

Acronym: Central Danube Tour

Source of finance: Interreg IPA Program of cross border cooperation Croatia-Serbia

Partners: PS for Regional Development, Interregional Cooperation and Local Government, Serbia, Public Institution Županijska development agency of Osječko-baranjske Municipality, Croatia, Osječko-baranjska Municipality, Croatia, Danube Competence Center, Serbia, Town Ilok, Croatia

„Colorful cooperation“

Acronym: ColourCoop

Source of finance: Interreg IPA Program of cross border cooperation Hungary-Serbia

Partners: PS for Regional Development, Interregional Cooperation and Local Government, Serbia, City Novi Sad, Serbia, City Subotica, Serbia, Foundation for each other – Morahalom, Hungary, Non-profit public company Ltd Euroregional Development Agency for Development DKMT Dunav-Kriš-Moriš-Tisa

„The repairing of the navigation infrastructure on Bega Canal“

Acronym: BEGA

Source of finance: Interreg IPA Program of cross border cooperation Romania-Serbia

Partners: PS for Regional Development, Interregional Cooperation and Local Government, Serbia, Banat River Basin Administration, Romania, Public water management company Vode Vojvodine (Water of Vojvodina), Serbia, Timiș County Council, Romania

„Health Tourism – Good Tourism: Joint Development of Medical and Health Tourism in the HU-SRB Cross-Border Region“

Acronym: HEALTH-TOUR

Source of finance: Interreg IPA Program of cross border cooperation Hungary-Serbia

Partners: PS for Regional Development, Interregional Cooperation and Local Government, Serbia, Bač-Kiškunska County, Hungary

„Development of the business environment through the education of the labor force in accordance with the market needs“

Acronym: COMMON

Source of finance: Interreg IPA Program of cross border cooperation Croatia-Serbia

Partners: PS for Regional Development, Interregional Cooperation and Local Government, Serbia, VURA – Development Agency Vukovar Ltd, Croatia, Studium School from Vukovar, Croatia

Provincial Secretariat for Agriculture, Water Management and Forestry

Allocation of funds

1. Competition for the allocation of funds for co-financing investments in the procurement of equipment for protection against weather disasters and elements necessary for raising production plantations of fruit trees, vines and hops on the territory of AP Vojvodina
2. Competition for co-financing investments in the procurement of equipment for the production of wine and brandy on the territory of AP Vojvodina
3. Competition for the allocation of incentive funds for the removal of illegal landfills from agricultural land, that is bringing the purpose of agricultural land in the territory of AP Vojvodina
4. Competition for the allocation of incentive funds through a competition for the implementation of works on the arrangement of the canal network in the function of drainage of agricultural land in the territory of AP Vojvodina
5. Competition for the allocation of funds for co-financing the costs of procurement of connected machinery, machinery and equipment for organic production in the territory of AP Vojvodina
6. Competition for the allocation of funds for co-financing the procurement of structures and equipment for plant production in a protected area on the territory of AP Vojvodina
7. Competition for the allocation of funds for co-financing the procurement of equipment and irrigation systems and equipment for improving the water, air and heat regime of plants in the territory of AP Vojvodina
8. Competition for the allocation of funds for co-financing investments in beekeeping in AP Vojvodina
9. Competition for the award of grants for equipping livestock farms in AP Vojvodina
10. Competition for the allocation of funds for co-financing investments in physical assets of agricultural holdings in the sector of fruits, grapes, vegetables (including mushrooms), flowers and other crops in AP Vojvodina
11. Competition on the allocation of funds for co-financing the construction, rehabilitation and reconstruction of water facilities in public ownership and fecal sewage facilities in the territory of AP Vojvodina
12. Competition for co-financing the arrangement of local land roads and local landfills on the territory of AP Vojvodina
13. Competition for the allocation of funds for financing the intensification of the use of agricultural land available to scientific research institutions, secondary agricultural schools and other secondary schools that educate students of agricultural profession - through the purchase of equipment
14. Competition for the allocation of funds for the construction of new fish ponds and reconstruction of existing ones on the territory of AP Vojvodina
15. Competition for the distribution of funds from the budget for the development of hunting in AP Vojvodina

Annex 2

PUBLIC COMPETITION FOR ALLOCATION OF FUNDS OF THE PROVINCIAL SECRETARIAT FOR FINANCE IN 2021 FOR PARTICIPATION IN CO-FINANCING PROJECTS FINANCED FROM EUROPEAN UNION FUNDS

| No | Company | | Name of projects | Funds in dinars |
|-----|------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| | Name | Identification number | | |
| 1. | PUBLIC UTILITY COMPANY "GRADSKO ZELENILO" NOVI SAD | 08055432 | CITY GREENING - DEVELOPMENT AND PROMOTION OF ENERGY EFFICIENCY AND SUSTAINABLE ENVIRONMENT IN URBAN ENVIRONMENTS IN CITIES OF THE CROATIA-SERBIA CROSS-BORDER REGION | 1.445.046,55 |
| 2. | PE VOJVODINA SHUME | 08762198 | LET'S PROTECT WILD BIRDS - LET'S PROTECT HABITATS - LET'S PROTECT HUMANS | 1.806.158,60 |
| 3. | PE VOJVODINA SHUME | 08762198 | IMPROVING FLOODPLAIN FOREST MANAGEMENT ALONG THE DANUBE IN THE HU-SRB CBC AREA | 2.193.841,40 |
| 4. | REGIONAL AGENCY FOR DEVELOPMENT OF SMALL AND MEDIUM ENTERPRISES "ALMA MONS" DOO NOVI SAD | 08743038 | PARTICIPATORY ECOSYSTEMS TO ENCOURAGE REVITALIZATION OF RURAL-URBAN COOPERATION THROUGH DANUBE CIRCULAR MANAGEMENT BIOECONOMICS | 500.000,00 |
| 5. | HIGH TECHNICAL SCHOOL OF PROFESSION STUDIES SUBOTICA | 08009201 | REGIONAL INNOVATION LABORATORY FOR INDUSTRIAL AUTOMATION AND MECHATRONICS – INDUSTRY 4.0 | 1.716.001,37 |
| 6. | UNIVERSITY OF NOVI SAD, FACULTY OF AGRICULTURE | 08608369 | IMPROVMENT THE WATER QUALITY OF THE DANUBE AND ITS TRIBUTARIES BY INTEGRATED MANAGEMENT OF FLOODING AREAS BASED ON ECOSYSTEMS SERVICES | 1.039.726,10 |
| 7. | CITY SUBOTICA | 08070695 | TRAFFIC OPTIMIZATION IN THE BORDER ZONE BY CONSTRUCTION OF BICYCLE TRAILS | 3.998.271,18 |
| 8. | CITY ZRENJANIN | 8002266 | INCREASING ECONOMIC COMPETITIVENESS AND INNOVATIVE DEVELOPMENT OF SMALL AND MEDIUM ENTERPRISES THROUGH SCHOLARSHIPS FOR YOUNG PEOPLE IN THE MOROHALOM-ZRENJANIN PROGRAM | 4.000.000,00 |
| 9. | CITY KIKINDA | 08176396 | ECOSYSTEM REHABILITATION AND PRESERVATION OF NATURAL VALUES IN ŽOMBOLJE AND KIKINDA | 3.980.630,72 |
| 10. | INSTITUTE FOR CARDIOVASCULAR DISEASES OF VOJVODINA | 08113645 | DEVELOPMENT OF A CROSS BORDER NETWORK FOR TELECONSULTATIONS OF HEALTHCARE INSTITUTIONS FOR CARDIOVASCULAR DISEASES | 2.595.088,55 |
| 11. | TOWN SREMSKA MITROVICA FOR INDIRECT USER - TOURIST ORGANIZATION | 08898774 | ADRIATIC LANDSCAPE NETWORK INTERPRETATION | 2.284.868,97 |
| 12. | MUNICIPALITY KANJIŽA | 08141231 | PRESERVATION OF NATURAL AND CULTURAL VALUES IN THE KANJIŽA AND SEGEDIN REGION | 1.000.000,00 |
| 13. | GERONTOLOGICAL CENTER SUBOTICA | 08121249 | CROSS BORDER SENIOR ENTREPRENEURSHIP INCUBATOR | 1.682.002,73 |
| 14. | FACULTY OF NATURAL SCIENCES | 08104620 | CITY GREENING - DEVELOPING AND PROMOTING ENERGY EFFICIENCY AND SUSTAINABLE URBAN ENVIRONMENT IN BORDER TOWNS BETWEEN CROATIA AND SERBIA | 1.300.000,00 |

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| 15. | HIGH SCHOOL OF PROFESSION STUDIES NOVI SAD | 08640343 | INTRODUCTION TO EU - EDUCATION FOR SECONDARY SCHOOLS | 818.748,15 |
| 16. | FACULTY OF TECHNOLOGY NOVI SAD | 08055203 | BUILDING ENTREPRENEURIAL ECOSYSTEM - STUDENT ENTREPRENEURSHIP BEYOND BORDERS | 1.768.175,08 |
| 17. | FACULTY OF SCIENCES | 08104620 | PROMOTION OF NATURAL AND CULTURAL HERITAGE FOR THE DEVELOPMENT OF SUSTAINABLE TOURISM IN PROTECTED AREAS | 1.300.000,00 |
| 18. | STUDENT CULTURAL CENTER IN NOVI SAD | 08590966 | BE SPECACTIVE! – SECOND EDITION | 2.590.346,46 |
| 19. | CITY SREMSKA MITROVICA | 08898774 | MOVING FORWARD TO SUPPORT THE SOCIAL ECONOMY THROUGH INTER-REGIONAL COOPERATION AND DEVELOPING EDUCATION AND TRAINING FOR YOUNGER PERSONS — COOP FWD | 204.771,97 |
| 20. | MUNICIPALITY SEČANJ | 08019215 | JOINT LIFE SUPPORT IN THE CROSS BORDER AREA | 2.382.371,09 |
| 21. | PROFESSOR SECONDARY SCHOOL “BORISLAV MIHAJLOVIĆ – MIHIZ” IRIG | 08905908 | DEVELOPMENT OF CB WINE AREAS FOR LEARNING | 1.294.979,15 |
| 22. | HIGH SCHOOL OF PROFESSION STUDIES FOR EDUCATORS “MIHAILO PALOV” VRŠAC | 08038830 | FOR A UNIQUE NEW EDUCATION | 1.712.552,16 |
| 23. | MUNICIPALITY KOVAČICA | 08154295 | INCREASING THE QUALITY OF MEDICAL SERVICES FOR CROSS BORDER COMMUNITIES | 2.124.789,43 |
| 24. | UNIVERSITY IN NOVI SAD | 08067066 | DUAL EDUCATION FOR INDUSTRIAL AUTOMATION AND ROBOTICS IN KAZAKHSTAN | 212.805,75 |
| 25. | UNIVERSITY IN NOVI SAD | 08067066 | DEVELOPMENT OF THE MASTER CURRICULUM IN ECOLOGICAL MONITORING AND BIOINDICATION OF INLAND WATERS AT HIGHER EDUCATION INSTITUTIONS IN THE WESTERN BALKANS REGION | 243.217,49 |
| 26. | UNIVERSITY IN NOVI SAD | 08067066 | CAPACITY BUILDING FOR THE IMPLEMENTATION OF DUAL EDUCATION IN HIGHER EDUCATION IN BOSNIA AND HERZEGOVINA | 212.805,75 |
| 27. | UNIVERSITY IN NOVI SAD | 08067066 | ADVANCED DATA ANALYSIS IN BUSINESS | 258.423,35 |
| 28. | UNIVERSITY IN NOVI SAD | 08067066 | PROFESSIONAL TRAINING OF VOCATIONAL STUDY TEACHERS IN ACCORDANCE WITH EUROPEAN PRACTICES | 212.805,75 |
| 29. | UNIVERSITY IN NOVI SAD | 08067066 | STRENGTHENING TEACHING COMPETENCES IN HIGHER EDUCATION IN NATURAL AND MATHEMATICAL SCIENCES | 182.394,01 |
| 30. | UNIVERSITY IN NOVI SAD | 08067066 | IMPROVING DIGITAL COMPETENCES AND ENTREPRENEURIAL SKILLS OF ACADEMIC MUSICIANS IN SERBIA FOR A CULTURALLY ENGAGED SOCIETY | 197.599,88 |
| 31. | SCHOOL CENTER “NIKOLA TESLA” VRŠAC | 08114803 | E-SUPPORT SERVICES FOR CAREER AND PROFESSIONAL CONSULTING OF YOUNG PEOPLE ENTERING IN THE LABOR MARKET | 704.878,35 |
| 32. | INSTITUTE OF PUBLIC HEALTH SOMBOR | 08333092 | MOSQUITO CONTROL IN THE BORDER AREA 2 | 2.104.326,40 |
| 33. | MUNICIPALITY KANJIŽA | 08141231 | HORGOS - RESKE - SEGEDIN - A GOOD WAY CONNECTS PEOPLE | 2.000.000,00 |
| 34. | MUNICIPALITY KANJIŽA | 08141231 | WITHIN THE CIRCLE - DIVERSITY AND INTEGRATION | 1.000.000,00 |
| 35. | MUNICIPALITY KOVAČICA | 08154295 | BANAT GREEN CORRIDOR - CONNECTING PEOPLE WITH NATURE AND CULTURE | 2.177.224,11 |

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| 36. | GYMNASIUM "BORISLAV PETROV BRACA" VRŠAC | 08060967 | ONLINE CAREER SUPPORT SERVICES FOR PROFESSIONAL CONSULTING OF YOUNG PEOPLE ENTERING IN THE LABOR MARKET | 704.878,35 |
| 37. | UNIVERSITY OF NOVI SAD, FACULTY OF TECHNICAL SCIENCES | 08067104 | TRANSNATIONAL COOPERATION OF CLUSTERS WHICH ARE ACTIVE IN THE FIELD OF AGRICULTURE AND FOOD, ON THE BASIS OF ACCESS SMART SPECIALIZATIONS IN THE DANUBE REGION | 101.194,07 |
| 38. | SCHOOL FOR PRIMARY AND SECONDARY EDUCATION WITH THE HOUSE OF STUDENTS "MILAN PETROVIĆ" | 08067007 | CROSS BORDER SOUND, DANCE AND PICTURE FOR PERSONS WITH DISABILITIES | 631.551,68 |
| 39. | UNIVERSITY OF NOVI SAD, FACULTY OF TECHNICAL SCIENCES | 08067104 | VALORISING CULTURAL HERITAGE AND FOSTERING SUSTAINABLE TOURISM BY LIVING THE COMMON HISTORY ON THE DANUBE LIMES | 327.339,65 |
| 40. | UNIVERSITY IN NOVI SAD | 08067066 | HARMONIZATION AND INNOVATION IN DOCTORAL STUDY PROGRAMS FOR PLANT HEALTH IN SUSTAINABLE AGRICULTURE | 228.011,62 |
| 41. | UNIVERSITY IN NOVI SAD | 08067066 | STRENGTHENING EDUCATIONAL CAPACITIES IN THE FIELD OF NOISE ENGINEERING AND VIBRATION WITH THE DEVELOPMENT OF COMPETENCE AND COOPERATION BETWEEN STAKEHOLDERS | 228.011,62 |
| 42. | UNIVERSITY IN NOVI SAD | 08067066 | STRENGTHENING THE MASTER STUDY PROGRAM IN MANAGEMENT OF WATER RESOURCES AT HIGHER EDUCATION INSTITUTIONS AND THE WESTERN BALKANS | 197.599,88 |
| 43. | UNIVERSITY IN NOVI SAD | 08067066 | INTERDISCIPLINARY PROGRAM OF SHORT CYCLES IN THE FIELD OF PUBLIC POLICY CREATION AND ANALYSIS | 228.011,62 |
| 44. | UNIVERSITY OF NOVI SAD, FACULTY OF TECHNICAL SCIENCES | 08067104 | F(OL)LOW THE PLASTIC FROM SOURCE TO THE SEA: TISA- DANUBE INTEGRATED ACTION PLAN TO ELIMINATE PLASTIC POLLUTION OF RIVERS | 672.171,58 |
| 45. | CITY PANČEVO | 08331537 | BOUNDING BOARD - SUPPORT FOR HOUSING AND ACTIVE SOCIAL INCLUSION OF VULNERABLE GROUPS IN PANČEVO | 3.999.891,10 |
| 46. | MUNICIPALITY SENTA FOR INDIRECT USER - HISTORICAL ARCHIVE | 08038490 | LIVING ARCHIVES - MEMORY OF THE PAST BECAUSE FUTURE | 1.016.458,83 |
| 47. | CITY SUBOTICA FOR INDIRECT USER - CITY MUSEUM OF SUBOTICA | 08070695 | CULTURAL COOPERATION ON THE TOPIC "THE HISTORY IN BAČKA" AND PROMOTION OF TOURISM IN THE REGION | 929.205,41 |
| 48. | MUNICIPALITY SENTA | 08038490 | BANAT TOURIST BICYCLE ROAD CONNECTION | 3.423.436,44 |
| 49. | UNIVERSITY OF NOVI SAD, FACULTY OF TECHNICAL SCIENCES | 08067104 | RENEWABLE ENERGY SOURCES FOR SMART SUSTAINABLE COMMUNITY HEALTH CENTERS, FACULTIES AND OTHER PUBLIC INSTITUTIONS | 1.499.294,70 |
| 50. | MUNICIPALITY ODŽACI | 08327700 | FOR A BETTER FUTURE | 4.619.299,54 |
| 51. | SPECIAL HOSPITAL FOR PSYCHIATRIC DISEASES "DR SLAVOLJUB BAKALOVIĆ" | 08044821 | HEALTHY AGING AND DEMENTIA - A BETTER LIFE | 2.599.738,95 |
| 52. | MUNICIPALITY MALI İDOŠ | 08695059 | THE TASTES OF BAČKA, ADVENTURE AND DEVELOPMENT OF CULTURAL VALUES - FORMATION OF CROSS BORDER TOURIST ROUTES WITH REPRESENTING GASTRONOMY AND LOCAL PRODUCTS | 2.421.081,10 |
| 53. | CLINICAL CENTER OF VOJVODINA, NOVI SAD | 08664161 | RENEWABLE ENERGY SOURCES FOR SMART SUSTAINABLE COMMUNITY HEALTH CENTERS, FACULTIES AND OTHER PUBLIC INSTITUTIONS | 2.521.576,20 |
| 54. | MUNICIPALITY ŽITIŠTE | 08030715 | JOINT SUPPORT ON THE PATH OF LIFE IN CROSS BORDER AREA | 2.352.188,58 |

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| 55. | TOWN VRŠAC | 08267944 | SOCIAL HOUSING IN BALATA | 3.999.255,12 |
| 56. | REGIONAL DEVELOPMENT AGENCY SREM DOO | 20645750 | ECONOMIC INTEGRATION OF MIGRANTS THROUGH SOCIAL ENTREPRENEURSHIP | 725.085,41 |
| 57. | REGIONAL CENTER FOR SOCIO-ECONOMIC DEVELOPMENT BANAT DOO | 08760071 | TRANSNATIONAL PARKS AND GARDEN RESOURCES ON ADRIATIC - IONIAN TOURIST MARKET | 299.767,80 |
| 58. | REGIONAL CENTER FOR SOCIO-ECONOMIC DEVELOPMENT BANAT DOO | 08760072 | ADRIATIC - IONIAN NETWORK OF AUTHENTIC VILLAGES | 249.806,50 |
| 59. | REGIONAL CENTER FOR SOCIO-ECONOMIC DEVELOPMENT BANAT DOO | 08760073 | CIRCULAR INNOVATION AND RESISTANT CITY LABORATORIES IN THE ADRIATIC - IONIAN REGION | 324.748,45 |
| 60. | REGIONAL CENTER FOR SOCIO-ECONOMIC DEVELOPMENT BANAT DOO | 8760073 | INNOVATIVE MODEL OF INCREASING DIVERSITY AND ENERGY SECURITY OF THE DANUBE REGION BY COMBINING BIOENERGY WITH UNUSED RENEWABLE ENERGY | 124.903,25 |
| 61. | WATER MANAGEMENT SOCIETY "SAVA" DOO SREMSKA MITROVICA | 8039593 | STRENGTHENED CAPACITIES OF PROTECTION AND RESCUE INSTITUTIONS | 993.669,13 |
| 62. | BUSINESS INCUBATOR SUBOTICA DOO | 20191872 | REGIONAL INNOVATION LABORATORY FOR INDUSTRIAL AUTOMATION AND MECHATRONICS - INDUSTRY 4.0 | 176.334,00 |
| 63. | UNIVERSITY EDUKONS | 08891443 | AUTHENTIC GOURMET TASTE FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT OF CROSS BORDER REGION | 511.962,18 |
| 64. | UNIVERSITY EDUKONS | 08891443 | DEVELOPMENT OF CB WINE LEARNING AREAS | 511.962,18 |
| 65. | INSTITUTE OF LOWLAND FORESTRY AND ENVIRONMENT | 08865248 | IMPROVING FLOODPLAIN FOREST MANAGEMENT ALONG THE DANUBE IN THE HU-SRB AREA | 351.345,50 |
| 66. | SCIENTIFIC INSTITUTE OF VETERINARY "NOVI SAD" | 08608857 | LET'S PROTECT WILD BIRDS - LET'S PROTECT HABITATS - LET'S PROTECT HUMANS | 695.135,08 |
| 67. | REGIONAL DEVELOPMENT AGENCY SOUTH BANAT | 21263001 | CROSS BORDER NETWORK OF EDUCATION AND RESEARCH NATURAL RESOURCES | 1.000.000,00 |
| 68. | OPEN UNIVERSITY OF SUBOTICA DOO | 08304041 | FILM ART CONNECTS CROSS BORDER REGION | 220.417,50 |
| 69. | OFFICE FOR THE ROMA (GYPSIES) INCLUSION | 08861994 | DANUBE REGION FOR IMPROVING ACCESS AND STRENGTHENING THE DEVELOPMENT OF THE ROMA (GYPSIES) COMMUNITY | 369.816,48 |
| 70. | MICRO-REGION TOURIST CLUSTER FUND SUBOTICA - PALIĆ | 08890544 | PANONA NET - MANAGEMENT MODEL OF DESTINATION | 258.623,20 |
| 71. | YOUTH BASKETBALL CLUB "SPARTAK" SUBOTICA | 08863563 | BASKETBALL WITHOUT BORDERS - SPORT IS A PART OF OUR CULTURE WHICH HELPS TO MEET EACH OTHER | 258.623,20 |

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| 72. | FOOTBALL CLUB VINOGRADAR HAJDUKOVO | 08074283 | FOOTBALL ACROSS THE BORDER | 253.450,74 |
| 73. | DIVING CLUB SREMSKA MITROVICA | 28801157 | STRENGTHENED CAPACITIES OF PROTECTION AND RESCUE INSTITUTIONS | 230.278,10 |
| 74. | RED CROSS OF SERBIA - RED CROSS OF VOJVODINA | 08044198 | NATURE FOR THE FUTURE WITHOUT BORDERS | 304.000,00 |
| 75. | CENTER FOR PRODUCTION OF KNOWLEDGE AND SKILLS | 28077076 | DANUBE REGION FOR IMPROVING ACCESS AND STRENGTHENING THE DEVELOPMENT OF THE ROMA (GYPSIES) COMMUNITY IN THE FRAMEWORK OF DANUBE TRANSNATIONAL PROGRAM | 284.485,52 |
| 76. | SPORTS ASSOCIATION ACADEMY "NJERŠ IŠTVAN" | 28770332 | MULTISPORT ACROSS THE BORDER | 235.347,11 |
| 77. | DIGITAL REGION ASSOCIATION | 28024819 | DIGITAL MEETS CULTURE: PROMOTION OF THE CROSS BORDER HERITAGE THROUGH DIGITAL PRISM | 286.000,00 |
| 78. | TABLE TENNIS CLUB SENTA | 08088896 | CONTINUATION OF CROSS BORDER INTEGRATED TABLE TENNIS PROGRAMS FOR RECREATIONAL STUDENTS, ATHLETES AND DISABLED ATHLETES | 286.000,00 |
| 79. | ASSOCIATION "PETROVARADIN MEDIA" | 28220677 | MEDIA LITERACY OBSERVATORY FOR ACTIVE CITIZENSHIP AND SUSTAINABLE DEMOCRACY | 301.485,52 |
| 80. | CLUSTER FOR ECOLOGICAL ENERGY AND ECOLOGICAL CULTURE "ECOPANONIA" | 28055153 | BOOSTING UNTAPPED GREEN BUSINESS DEVELOPMENT THROUGH PUBLIC PROCUREMENT IN ASIA AND THE MIDDLE EAST | 279.313,06 |
| 81. | SOCIETY OF INTELLECTUALS "BRAĆA TAN" | 08636486 | NATURAL HEALTH - FOR HEALTH THROUGH THE PROTECTION OF NATURAL HERITAGE | 286.000,00 |
| 82. | NOVI SAD SCHOOL OF JOURNALISM | 08672024 | WESTERN BALKANS MEDIA LITERACY | 282.519,98 |
| 83. | ASSOCIATION OF AGRICULTURAL PRODUCERS "PAČIR" | 08883068 | LOCAL TASTES - LOCAL VALUES - LOCAL FOOD | 279.313,06 |
| 84. | ASSOCIATION FOR DEVELOPMENT OF THE MUNICIPALITY BACKA TOPOLA | 088417505 | LOCAL TASTES - LOCAL VALUES - LOCAL FOOD | 301.485,52 |
| 85. | SAILING CLUB PALIĆ | 8135223 | STRENGTHENING COOPERATION IN WATER SAILING IN CROSS BORDER REGION | 286.000,00 |
| 86. | NEW CULTURAL SETTLEMENT, NOVI SAD | 28149786 | DEBATE YOUR ISSUE | 286.000,00 |
| 87. | NEW CULTURAL SETTLEMENT, NOVI SAD | 28149786 | DANUBE URBAN BRAND + BUILDING LOCAL AND REGIONAL RESILIENCE TROUGH THE VALORIZATION OF DANUBE'S CULTURAL HERITAGE | 286.000,00 |
| 88. | FRIENDS OF PANČEVO, PANČEVO | 08839573 | BANAT GREENWAY CORRIDOR- CONNECTING PEOPLE TO NATURE AND CULTURE | 286.000,00 |
| 89. | CINEMA CITY ASSOCIATION | 28002262 | RIVERS FOR LOCAL COMMUNITIES - REVIVAL IDENTITY OF COASTAL LOCAL COMMUNITIES | 286.000,00 |
| 90. | SENTA CHESS CLUB | 8089167 | IMPROVING CROSS BORDER COOPERATION IN THE PROMOTION OF CHESS SPORTS AND CHESS YOUTH EDUCATION | 227.632,38 |
| 91. | TERAFORMING SOUTH | 28024410 | HANNAH CHALLENGING AND DEBUNKING ANTISEMITIC MYTHS | 301.474,45 |
| 92. | ASSOCIATION "KULTURANOVA" | 08727473 | Z ELEMENTS ARTISTIC EXPERIENCES AND EXCHANGES TO ATTRACT A YOUNGER AUDIENCE TRANSMEDIA CO-SREATIONS | 286.000,00 |

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| 93. | ASSOCIATION "KULTURANOVA" | 08727473 | TRAINART | 286.000,00 |
| 94. | SOCIETY FOR THE PROTECTION AND STUDY OF BIRDS | 08196788 | STRENGTHEN OF NATIONAL CAPACITIES TO COMBAT AGAINST WILD ANIMAL POISONING AND RAISE AWARENESS OF THE PROBLEM IN THE BALKAN COUNTRIES | 268.968,13 |
| 95. | ASSOCIATION "KULTURANOVA" | 08727473 | RIVERS2COMMUNITIES | 286.000,00 |
| 96. | ASSOCIATION "KULTURANOVA" | 08727473 | WHAT'SAP EXCHANGE OF SOCIAL ART PRACTICES | 286.000,00 |

Annex 3

Adherence with GCF investment Criteria (unmodified from Annex 10 of the Concept Note)

| | Indicator | Expected Result | Rationale |
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| Impact Potential | Project lifetime emission reductions (in tonnes of carbon dioxide equivalent) | 9.5 million tonnes of CO ₂ | <p>The project will increase the capacity of public and private forests to remove CO₂, it will reduce the negative impact of drivers of forest degradation and it will support Serbian companies to decarbonize their processes and increase their resilience.</p> <p>With regards to mitigation impacts, the project used FAO EX-ACT, a tool specifically designed for evaluating the carbon impact of projects in the AFOLU sector that uses IPCC methodology (Annex 7).</p> |
| | Expected change in loss of lives, value of physical assets, livelihoods, and/or environmental or social losses due to the impact of extreme climate-related disasters and climate change in the geographical area of the GCF intervention. | <p>500,000 hectares of public natural forests and 18.3 thousand hectares of private forests are under CAS/SFM</p> <p>Direct beneficiaries: 95,000 (48,450 women)</p> | <p>The project will transfer to Serbia the knowledge, technology and CAS practices needed to reduce the climate change and adaptation deficit of public and private forest stakeholders, as well as to enable the forest sector to become more resilient to climate change and contribute effectively and efficiently to the national decarbonization process. The adaptation impact of this proposal on ecosystem and ecosystem services originates from the estimation that every year 1/10 of the Forests Management Plans (FMPs established with the 2010, Law on Forests) will be developed with climate adaptive silviculture practices and executed. This is calculated based on current capacities of forestry institutions and does not include yet the impact on privately own forests. This will be added in the FP. Concerning the number of beneficiaries, the proposal included those that will be included in the trainings and capacity development programs as well as those that will benefit directly from forests and new forests in terms of disaster risk reduction, improved access to non-wooded products and biodiversity.</p> |
| Paradigm Shift | Project Vision | <p>IF the forestry sector is climate resilient and forests are restored, expanded and sustainably managed involving institutions, communities and private sector companies; THEN forests will support and facilitate the decarbonization objectives of the country BECAUSE the increase of carbon removals will reduce the net country emissions and it will provide for local, transparent and monitorable carbon reduction and offsetting opportunities for companies.</p> | <p>Vision: The paradigm shift of the project lays on three pillars. First, the low carbon development strategy of Serbia is strictly connected to the health of forests¹⁰ and their capacity to remove CO₂ emissions, to provide energy and offsetting opportunities. Therefore, the adaptation of the sector and reduction/removal of the negative impacts of drivers of forest's degradation (i.e. unsustainable fuelwood harvest) are preconditions for decarbonization in Serbia. Second, the governance of forests as well as provision of ecosystem services (i.e. carbon removals and fuel biomass) can no longer be mandated to public and central institutions only. It requires new paradigms where communities, local authorities and the private sector could participate and invest. Therefore the proposed offsetting and insetting mechanism (national level) will provide the forestry sector with additional financial resources making the sector less depended on national budget or external donors. Third, transparency and evidence-based forest monitoring and reporting are paramount to secure the trust of national and international stakeholders and to assure that reported data about forests and emissions are verified.</p> <p>Innovation: The project offers an innovative approach to forest investments, forest management and mobilization of private actors in getting involved in decarbonization processes. As presented in the Theory of Change (Section B2 and Annex 2), the combination of climate adaptive silviculture practices with: tailored forestry investments (Component 2), improvements in governance / institutional capacity development of stakeholder (Component 1)</p> |

¹⁰ Shelterbelts / Windbreakers / Energy Plantations.

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| | | | <p>and involvement of the private sector (Component 3) will increase carbon removals from the forest sub-sector. A stronger and transparent forestry sector will also enable to unlock new opportunities in terms of national offsetting and insetting. This will allow the private sector to enter gradually and effectively the decarbonization process permitting additional emissions reductions. Initiating the decarbonization process without addressing forests and forest management practices will not be cost efficient as it will not reduce net emissions due to forest's degradation and consequent reduction in carbon removals. Finally, the project will introduce and mainstream mechanisms, technologies, practices and forestry investments at the national level involving all the public and private stakeholders active in the forestry and decarbonization sectors (National Level). This will allow for faster scaling up of project activities including among private sector actors.</p> <p>The project will kick start the low carbon development pathway of Serbia while the establishment of the national decarbonization facility (as foreseen by the Law on Climate Change, 26/2021) will support companies in developing decarbonization strategies and action plans and accessing dedicated technical and financial support to secure investments in GHG reduction. Finally, by supporting the country in establishing a national offsetting and insetting mechanism will also allow to include soil carbon and therefore expand the mechanism to the entire agriculture sector.</p> <p>Finally, by addressing carbon removals with climate adaptive silviculture approaches vs. the business as usual will magnify the investment as investing on forestry will also have tangible and quantifiable benefits such as: (I) increased biodiversity in forest and agriculture land; (III) expansion of bio-corridors; (II) socio-economic of rural households; (IV) protection from disasters; (V) and soil erosion control. Each will be detailed with the FP and the Economic and Financial Analysis of the project.</p> <p>Potential for scaling up and replication: The established mechanisms and introduced practices / technologies will allow the country to scale up introduced investments on over 1,717,360 ha representing the MoAFW's target for 2022-2030¹¹ and expand it on the entire forest cover and the agriculture sector. Furthermore, the proposed theory of change and intervention strategy are replicable in the entire Balkan where the forestry sector is confronted with similar bottlenecks and drivers of degradation. Thanks to the cofinancing of FAO, the practices, mechanisms and technologies introduced by the project will be scaled up at the regional level. Finally, the AE is currently in the process of developing similar projects in the Republic of Moldova, North Macedonia and other countries and it will apply a blue print approach¹².</p> <p>In addition, the establishment of the national decarbonization facility (as foreseen by the Law on Climate Change, 26/2021) will enable companies to benefit from green loans aimed at decarbonizing their processes. This will create high potential for attracting other companies in the future, and contribute to the national offsetting market.</p> |
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¹¹ In the period 2022-2030, Serbia has planned to invest (if resources will be available) in: 48,000 ha of afforestation, 4,000 ha of shelterbelts, 199,200 ha of natural regeneration, 6,000 ha of plantation (mainly poplar), 1,258,440 ha of coppice stands restored of which 922,400 converted into high stands, and protection of forests from weather hazards on 201,720,000 ha.

¹² The current project blueprint approach as well as the main architecture of this concept note have been discussed and agreed with the NDA of the Republic of Moldova and it's currently being discussed with the NDA of the Republic of North Macedonia.

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| | | | <p>Finally, the project will work with public and private stakeholders including key associations such as the Chamber of Agriculture, the Serbia Grain Association, the Chamber of Commerce, Forest Owner Guild and SerBio. This will increase the ownership and participation of the private sector into the process supporting the scale up and replication at the national level of the project's activities.</p> <p>Potential for knowledge sharing and learning: the project will invest in trainings and capacity development of both public and private stakeholders (Component 1 and Component 3). Additionally, to further ensure long-term sustainability beyond the execution of funded activities, the project will coordinate with the Ministry of Education, Science and Technological Development the upgrade of national curricula (universities and vocational schools) related to the topics of the project.</p> <p>Contribution to the creation of an enabling environment: The establishment of the National Forest Monitoring and Assessment System (NFMA), the upgrade of the MRV system, as well as the national strategy for wood energy plantations and the national standard for biomass will strengthen the regulatory framework of the forest sector, and will have a spill-over effect in other sectors of the Serbian economy (e.g. advisory services and technical assistance). Combined with the decarbonization strategies of companies and the insetting/offsetting mechanism, this will set up the enabling conditions for the private sector to keep being engaged in the long-term decarbonization of the national economy, for the agriculture sector to contribute to the decarbonization process and to create new market opportunities in the forestry sector (e.g green biomass).</p> <p>Contribution to the regulatory framework and policies: in addition to the contribution highlighted in table 3, the project will contribute to the execution of the climate change law (national decarbonization facility) and in ensuring the provision incentives (e.g. technical assistance and evidence based decarbonization governance) and loans (EBRD cofinancing) to the private sector to promote investments in low-emissions and climate resilient development.</p> <p>Overall contribution to climate resilient development pathways consistent with a country's climate change adaptation strategies and plans: the introduction of climate adaptive silviculture practices and technologies will increase the effectiveness and efficiency of investments in forests. Furthermore, the project will support the private sector and national institutions in greening the fuel biomass value chain and in supporting national actions to prevent land degradation via forestry and agroforestry use of degraded soils.</p> |
| Sustainable Dev. | <i>Economic co-benefits</i> | To be calculated during the design phase | <p>Economic benefits will originate from: (I) the offsetting mechanism that will increase the budget of the forestry sector, (II) the improved efficiency of wood biomass used for fuel, (III) the potential benefits that will originate from the degraded private lands converted to bioenergy plantations and from the lands protected by shelterbelts. Furthermore, the project will have a positive impact on households that will be expected to face a lower unit cost for energy produced by fuelwood. This lower unit cost of energy will enhance affordability of energy for the poorest segments of the population. In Serbia, households currently spend more than 10% of their average expenditure on energy. Coupled with environmental / energy efficiency awareness campaigns to avoid increase of consumption of fuel wood, lower fuel costs will also imply a lower share of overall spending going toward energy, freeing up resources for other household needs.</p> |

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| | <i>Social co-benefits</i> | To be calculated during the design phase | <p>The main social co-benefit generated by the project is the support to the decarbonization path of the country. Thanks to the introduced practices and technologies the project will possibly contribute to creating new job opportunities and new markets (e.g. CO₂ management, green biomass, climate adaptive nurseries). Furthermore, relevant cobenefits of reducing the adverse impacts of fuelwood include distinctive social benefits as project's activities will help reduce poverty in Serbia in three ways: (i) increased access to fuelwood with improved quality; (ii) greater transparency of the solid biofuel value chain, and (iii) enhanced economic opportunities through the sector's modernization. First, the availability of higher quality fuelwood (drier with higher caloric potential) will increase energy efficiency at the household level. Households are expected to face a lower unit cost for energy output produced by fuelwood. This lower unit cost of energy will enhance affordability of energy for the poorest segments of the population. In Serbia, households currently spend more than 10% of their average expenditure on energy. Coupled with environmental / energy efficiency awareness campaigns to avoid increase of consumption of fuel wood, lower fuel costs will also imply a lower share of overall spending going toward energy, freeing up resources for other household needs. Second, the project will enhance transparency around fuelwood availability and quality. Specifically, rural consumers will have greater knowledge around fuelwood types and heating appliances to make more informed consumption decisions. Third, the modernization of the biomass sector will create economic opportunities in rural areas, directly benefiting the population of these areas. A detailed description of how the proposal will involve and engage private sector operators is available in Annex 7 (Table 2).</p> |
| | <i>Environmental co-benefits</i> | To be calculated during the design phase | <p>In addition to the presented positive impacts in terms of CCM and CCA, the project will have positive impacts on biodiversity¹³, on soil quality¹⁴ and water availability, decrease of evapotranspiration and slow down soil erosion, increase agricultural yields, and protection of rural communities and infrastructures from flash floods, floods and landslides. To this end the project will collaborate with the Serbian Water Management Directorate to ensure, among the areas to be afforested, those identified by the Water Management Strategy (2017-2034) and paramount to prevent and mitigate soil erosion and floods. Furthermore, via afforestation activities and shelterbelts/windbreakers, the project will support to the active protection and conservation of biodiversity. These will create corridors and shelter for wild animal species and flora. Forestry investments will be executed in accordance with the Law on Nature Conservation and the Decree on the Ecological Network (Official Gazette of RS, No. 102/2010).</p> |
| | <i>Gender empowerment co-benefits</i> | To be calculated during the design phase | <p>The project will benefit the entire population of Serbia with some specific focus on sectorial stakeholders and private companies. In all training and investments, when possible, the project will give higher priority to women¹⁵ owning degraded coppice stands or abandoned/degraded lands cultivation of wooden species for bioenergy or other purposes and will ensure that at least 30% of beneficiaries are women.</p> |
| | <i>Sustainable Development Goals</i> | <p>Direct Contribution: 7 Affordable and Clean Energy (7.a); 12 Responsible Consumption and Production; 13 Climate Action; 15 Life on Land.</p> | <p>Identified SDGs indicators are additional to those that will be presented in detail in the logical framework matrix of the project. SDGs will be accounted for separately. Project's indicators will be clearly described and presented in the FP.</p> <p>Target 7.A By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote</p> |

¹³ Activities will follow specific protocols that will guarantee the use of local and species that will be selected based on the characteristics of existing forests. The project will not negatively impact ecosystems

¹⁴ Converting degraded agricultural lands that have been abandoned into biomass forests, will allow the lands to maintain value and produce income and for the soil to recover and gradually recover sufficient quality to sustain again agriculture. Furthermore, the activity will protect soils from erosions and will contribute to mitigation the adverse impacts of winds.

¹⁵ A preliminary list of beneficiaries disaggregated by gender will originate from the digital cadastre of the Republic of Serbia to ensure that gender accounting is well reflected in both the baselines and targets. Depending on the results of the analysis of the cadastre targets will be increased at design.

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| | | <p>Indirect Contribution: 17 Partnerships for the goals (17.3)</p> | <p>investment in energy infrastructure and clean energy technology. Indicator: 7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems</p> <p>Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources. Indicator: 12.2.1: Material footprint, material footprint per capita, and material footprint per GDP.</p> <p>Target 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle. Indicator 12.6.1: Number of companies publishing sustainability reports.</p> <p>Target 13.2: Integrate climate change measures into national policies, strategies and planning. Indicator 13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other).</p> <p>Target 15.2: By 2030, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally. Indicator 15.2.1 Progress towards sustainable forest management</p> |
| Need of Recipients | Vulnerability | <p>500,000 hectares of public natural forests and 36 thousand hectares of private forests are under CAS/SFM.</p> <p>Direct beneficiaries: 95,000 (48,450 women).</p> | <p>The forestry sector is among the most vulnerable sectors in Serbia. The reported decrease in carbon removal (-19.4% compared to 2010) is limiting the capacity of Serbia to execute the low carbon development strategy of its economy. As described in section B1, the project will address the vulnerability of the forestry sector by introducing climate adaptive silviculture technologies, processes and practices and will support the country in expanding/enhancing/establishing the needed policy and legal reforms to remove the bottlenecks that are at the root of the identified climate change adaptation deficit of the sector. The project will address the three main priority areas identified by the country for the forestry sector: (i) Risk Reduction; (ii) Monitoring and Research; and (iii) Policies, capacity building and awareness raising. Furthermore, the project will support the country in addressing the reported forest's overexploitation risk existing at local level due to fuelwood needs as well as the overall vulnerability of the population to natural hazards.</p> |
| | Country's financial, economic, social and institutional needs and the barriers to accessing domestic (public), private and other international sources of climate-related finance | <p>Public debt reached in 2020 about 58.2 % of GDP and the country is facing a recession (-1% GDP) due to COVID-19 pandemic. The country continues to implement programs that address structural weaknesses, increase public sector efficiency, and eliminate bottlenecks to private sector growth, along with maintaining macroeconomic stability including the introduction of a "green growth" program to its post-COVID-19 economic recovery efforts while responding to challenges that include a shrinking population, labor shortages, and climate change [WB, 2021]. Therefore, as reported in the NDC the country will be able to increase their share of climate change mitigation if financial support if provided. The project will only cover the additional cost of adapting to climate change and mitigation investments.</p> | |
| Country Ownership | Alignment with nationally determined contributions (NDCs), relevant national plans indicator, and/or enabling policy and institutional frameworks | <p>The project will address the needs and priorities reported by the Republic of Serbia in its NDC(s) (2015 and draft 2020), National Communications, National Adaptation Plan, Low Carbon Development Strategy, EU-related commitments and other national policy framework. In addition, the project will contribute to implement the GCF Country Programme of Serbia, by supporting the priority areas: cluster 1 Energy efficiency and use of renewable energy sources and cluster 3 NEXUS Water Resources – Agriculture – Forestry. Additional details are available in Tables 3 and 5 section B1.</p> | |

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| | <i>Engagement with relevant stakeholders, including national designated authorities indicator</i> | In March 2020 the Ministry of Agriculture, Forestry and Water Management informed FAO-REU that the project idea “ <i>Enhancing the resilience of Serbian forests through climate change adaptation and mitigation investments</i> ” submitted by the Directorate of Forests following a call for submission of project ideas issued by the National Designated Authority (NDA) in Serbia on 9 July 2019, was selected for inclusion into the Country Programme of the Republic of Serbia. The Ministry has accordingly requested FAO’s support in developing a GCF full project proposal. |
| Efficiency and Effectiveness | <i>Cost per tonne of carbon dioxide equivalent</i> | <p>The project will promote a more efficient and effective way to address forests, fuel wood and carbon removals. Private sector includes stimuli for private sector investments. Private sector investments will be incentivized and mobilized as an impact of the project via the offsets and insets. Private sector leveraged financing is also being explored with private banks and forest owners associations. The terms and catalytic effects of private financing will be analyzed during the design of the funding proposal.</p> <p>Cost per Tonne of CO2 eq. (GCF): USD 3 / tonne¹⁶ Cost per Tonne of CO2 eq. (Total): USD 10 / tonne</p> |
| | <i>Ratio of co-financing</i> | GCF/COFINANCING= 1/2.7 |
| | <i>Expected rate of return</i> | TBC at design. |
| | <i>Application of best practices</i> | The project will apply best practices from well-established climate adaptive silviculture experiences from Europe and other geographical areas that will secure forestry investments from design to maintenance. Additionally, the project will apply best practices from other countries (i.e. France, Australia) that have established their own national offsetting mechanisms. Finally, the project will apply biomass management best practices (e.g. wood biomass fuels standards for processing and use, creation of national biomass platforms) from Europe and other areas. |

¹⁶ The concept note presents a very rough first estimation on the carbon emission that will be more refined in the phase of detailed design with local data. The current cost corresponds to approximately 10 USD per tonne of CO2 avoided, which is in the range of other similar approved GCF projects, e.g. FP 143 in Brazil with a cost of approximately 18 USD per tonne of CO2 avoided.

Annex 4

Adherence with Relevant National Policies
(unmodified from Annex 8 of the Concept Note)

| # | Policy/Strategy | Addressed Priority | Contribution | Comp. |
|---|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1 | Low Carbon Development Strategy with action plan (2019) | Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9.7% in 2030 and between 33.5% and 54.5% by 2050 compared to 2010. | 5 decarbonization service providers (e.g. accountants/auditors) are operational. | 2 |
| | | | USD 50 million loans are disbursed to private sector companies to execute their respective decarbonization strategies (including insetting). No financial support will be provided for the purchase of offsets or carbon credits. | 3 |
| | | Specific objective 3: Increase the carbon sink in the Serbian Forests by 17% by 2030 and 22% by 2050; compared with 2010 | 10,000 ha of damaged forests restored, 10,000 ha of afforestation ¹⁷ , 1,000 ha of shelterbelts established. | 2 |
| | | | 24,000 ha of degraded state coppice stands converted into high forest. | 2 |
| | | | 2,000 ha of abandoned & degraded agricultural land is converted into bioenergy plantations. | 2 |
| | | | 18,300 hectares of private coppice stands is converted into high forests forest. | 2 |
| | | Specific objective 5: Promote transition to climate neutral and climate resilient economy and society. | Establishment of the national decarbonization facility. | 2 |
| 2 | Instrument for EU Pre-Accession Assistance IPA II (2018) | Design of modern, financially sustainable interventions in the areas of waste management, water management and wastewater treatment systems, nature protection, industrial pollution control and risk management [...]. | The national MRV system is upgraded (in relation to forestry) and operational ²¹ . | 1 |
| | | Integration of climate change relevant issues into the national development strategies, including in the area of mitigation of climate change, there is a need to strengthen the institutional capacity to design, implement and monitor mitigation policies and measures, with particular attention to GHG emission reduction activities | 8 National curricula (University and vocational schools working on forestry, agriculture and accounting) are upgraded with introduced practices and technologies. | 1 |
| 3 | Nationally determined contribution (NDC-2015-2025) | GHG emission reduction by 33% in 2030 compared to 1990 levels | Decarbonization via reductions, offsets and insetting activities corresponding to 478,702 t CO ₂ eq. per year equivalent to about 1% of yearly emissions based on 2018 assessment ²² . | 3 |
| | | Reforestation using climate adaptable tree species (5,000 ha annually by 2030) | 24,000 ha of degraded state coppice stands converted into high forest. | 2 |
| | | Conversion of coppice into high forests (7,000 ha annually by 2030) | 24,000 ha of degraded state coppice stands converted into high forest. | 2 |
| | | | 18,300 hectares of private coppice stands is converted into high forests forest. | 2 |
| 4 | National Adaptation Plan (2015-2021) | Establishment of new forests (total target area should amount to 6,000 ha per annum) | 10,000 ha of afforestation and 1,000 ha of shelterbelts/windbreaks established. | 2 |
| | | Improving the quality of forests. | 500,000 ha under sustainable and climate adaptive silviculture management. | 2 |
| 5 | National Communications (2013, 2017, 2020) | Increase adaptive capacity of forests, adaptive management of forests and forest resources | Establishment of a National Forest Monitoring and Assessment System. | 1 |
| | | | 500 operators of public and private enterprises, including nurseries, supported and trained in the production of diverse and climate adaptive forestry. 2 public nurseries upgraded to ensure the production of climate adaptive seedlings. | 2 |

¹⁷ Afforestation activities will be funded on public land owned by the state or municipalities currently not devoted to any use.

¹⁸ The possibility of including a blockchain technology approach to offsets to ensure transparency and efficiency of the process is currently being evaluated. A study is currently ongoing and results will be available during the design phase.

¹⁹ The price of offsets is currently being studied. A detailed market analysis and pricing strategy for the country will be provided with the full funding proposal.

²⁰ The project and the NDA will formulate the proposed mechanism following the best practices from France, California, UK, Colombia, New Zealand and Australia

²¹ The project will introduce specific geospatial analytic tools to support the upgrade of the national MRV system.

²² The projects' removals (e.g., the offsets) will be reflected also in the NDC (2025-2030) and the national GHG inventory. Details and procedures will be detailed with the full funding proposal.

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| | | Choice of adequate tree species and change of forest management practices | 500,000 ha under sustainable and climate adaptive silviculture management. | 2 |
| | | | 24,000 ha of degraded state coppice stands converted into high forest. | 2 |
| | | Rehabilitation of degraded lands by afforestation and prevention of erosion and land slide of forests | 2,000 ha of abandoned & degraded agricultural land ²³ are cultivated with fast-growing wooden species in short rotation for energy use | 2 |
| | | Development of a reliable and timely activity data collection system to estimate GHG emissions and removals. | Establishment of NFMA system. Regional knowledge sharing platform for national offsetting/insetting mechanisms in place. | 1 |
| | | Development and improvement of country-specific emission factors and other parameters, including supporting methodologies. | One national carbon offsetting / insetting mechanism is developed and active. | 1 |
| | | National Forest Inventory and integrated information system. | Establishment of NFMA system Upgrade of the MRV system to address the forest sector. Regional knowledge sharing platform for CAS in place. | 1 |
| | | Improving cross-sectoral cooperation and incorporating aspects of climate change into planning documents in the forestry sector. | 1 national strategy for wood energy plantations prepared. | 1 |
| | | | 2 Guidelines on climate adaptive nursery production and planting developed. | 1 |
| 6 | Forestry Development Strategy of the Republic of Serbia (2006) - not adopted | Conservation and improvement of the state of forests and the development of forestry as an economy branch. | 2,000 ha of abandoned/degraded land is converted into bioenergy plantations. 1 national carbon offsetting/insetting mechanism is developed and active. | 1,2 |
| | | Increase of the area under forest cover, which is necessary for increasing the contribution of forest sector to the State economy | 10,000 ha of afforestation 10,000 ha of forest restored and 1,000 ha of shelterbelts/windbreaks established. | 2 |
| 7 | Forestry Development Program (2010) ²⁴ | Provision of forest seed and planting material and preservation of the gene pool of forest trees | 60 million climate adaptive seedlings (local species/varieties) produced. | 2 |
| | | | 2 public nurseries (Vojvodina/C. Serbia) upgraded and operational. | 2 |
| | | System of planning in forestry | Establishment of the NFMA. | 2 |
| | | Climate change mitigation (organized promotion of use of wood biomass for energy production) | 1 platform involving stakeholders of the forestry and agricultural sector to support a modern and transparent biomass value chain. 1 national standard for biomass is endorsed 1 national strategy for wood energy plantations prepared. | 2 |
| 8 | National voluntary Land Degradation Neutrality targets | Improvement, restoration, rehabilitation of degraded areas, implementation of measures of sustainable land management. | 2,000 ha of abandoned/degraded land are cultivated with fast-growing wooden species in short rotation for energy use | 2 |
| | | To increase the area of national territory under forests to 41.4% by 2050 | 10,000 ha of afforestation 10,000 ha of forest restored and 1,000 ha of shelterbelts/windbreaks established. | |
| 9 | Biodiversity strategy of the Republic of Serbia (2011) | Promote the conservation of forest biodiversity, including genetic diversity, through the development of a forest certification programme and best practice guidelines for ecosystem-based sustainable forestry. | 60 million climate adaptive seedlings (local species/varieties) produced. | 2 |
| | | Develop forest management measures and guidelines to prevent genetically modified tree species, as well as non-native and invasive species, from negatively impacting on forest and general biodiversity. | 2 Guidelines on climate adaptive nursery production and planting developed | 1 |
| 10 | National strategy for Sustainable Use of Natural Resources and Goods (2012) | Embed the aspect of climate changes in all long-term investments (in particular, in the biological works such as amelioration of coppice and degraded forests and afforestation, primarily in the selection of types and technology of works). | 24,000 ha of degraded state coppice stands converted into high forest. 18,300 hectares of private coppice stands is converted into high forest. 10,000 hectares of degraded forests are restored. | 3 |
| 11 | Sixth National Report to the United Nations Convention on Biological Diversity (2019) | Preservation of biological diversity at the genetic, species and ecosystem level. | 24,000 ha of degraded state coppice stands converted into high forest. | 2 |
| | | Monitoring the impact of climate change on biodiversity and the impact of biodiversity on mitigating the effects of climate change. | Establishment of a NFMA. | 1 |

²³ The accredited entity will launch dedicated surveys and assessments to map the interest of households for planting forests on the abandoned agricultural and other bare lands in the regions of East Serbia and Vojvodina.

²⁴ The program has not been adopted yet.

Annex 5

Adherence with Relevant National Laws and Regulations (unmodified from Annex 8 of the Concept Note)

| # | Topic | Compliant with national law/regulation: | Compliance with National Strategies |
|---|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Policy dialogues and creation of standards; | Law on Government (OGRS, 79/05) | Strategy for Implementation of Archus Convention (OGRS, 103/11) |
| 2 | Creation of the offsetting and inseting mechanism; | Law on energy efficiency and rational use of energy (Draft, 2021); Law on energy (OGRS, 145/14) | Strategy for Energy Sector Development of the RS till 2025 with projections till 2030 (OGRS, 101/2015) |
| 3 | Forest restoration; | Law on Forests (OGRS, 30/10); Law on Nature Protection (OGRS, 36/09) | Forest Development Strategy of the Republic of Serbia (OGRS, 59/06); National Strategy for sustainable use of natural resources and goods (OGRS, 33/12) |
| 4 | Afforestation; | Law on Forests (OGRS, 30/10) | Forest Development Strategy of the Republic of Serbia (OGRS, 59/06); |
| 5 | Conversion of degraded agriculture lands into bioenergy plantations; | Law on Rational Use of Energy (OGRS No. 25/13) The new Law on Agricultural Land No. 62/06 The law on climate change (26/21) Law on Land Protection (OGRS, 112/15) | National Strategy of Sustainable Development ("Official Gazette of the RS", No. 57/2008) Climate change strategy (Draft, 2019) |
| 6 | Conversion of private and public degraded coppicing stands into high forests; | Law on Forests (OGRS, 30/10) | Forest Development Strategy of the Republic of Serbia (OGRS, 59/06) |
| 7 | Decarbonization of private sector companies; | Law on energy efficiency and rational use of energy (Draft, 2021); Law on energy (OGRS, 145/14) | Strategy for Energy Sector Development of the RS till 2025 with projections till 2030 (OGRS, 101/2015) |
| 8 | Upgrade the national curricula related to forestry and decarbonization processes. | Law on High Education (OGRS, 88/17); Law on Middle School Education (OGRS, 55/13) | Strategy for Education Development of the RS till 20230 (draft, 2021) |
| 9 | Establishment of an MRV system | Climate change law | Low Carbon Development Strategy |

ⁱ The specific scope of the mechanism will include afforestation, reforestation, natural regeneration, sustainable forest management, and conversion of degraded coppice stands into high forests. The project will also evaluate, at design, the possibility of including in the offsetting mechanism soil carbon removal as currently being done in other countries by private actors such as [INDIGO-AG](#), [NORI](#), [AgriProve](#), and [Verra](#).

ⁱⁱ Funded by FAO cofinancing.

ⁱⁱⁱ Public enterprises will include – among other – the following: "Srbijašume" - Belgrade, "Vojvodinašume" - Novi Sad, "Vrnjacka banja" – Central Serbia, National Parks under the Min. of Environment Protection such as PE NP "Tara", PE NP "Djerdap", PE NP "Kopaonik" and PE NP "Fruška gora".

^{iv} Activity 2.2 reports the project's contribution to national area targets in hectares.

^v Potential reforestation, natural regeneration and forest restoration sites have already been identified, mapped and discussed with stakeholders. Details and related maps will be made available with the full funding proposal.

^{vi} FAO and the Government of Serbia have already preliminarily identified potential areas that are suitable for afforestation investment (Ref: new Annex 7).

vii The project will work with the Ministry of Agriculture, Forests and Water Management, with the Ministry of Environment Protection and specialized environmental agencies and civil society organizations to ensure that coppice sites are selected based on specific criteria (e.g. biodiversity).

viii Funded by FAO cofinancing.

ix Private Sector will be involved on voluntary bases. Thanks to the digital cadastre, the project will ensure direct contact with private sector operators (possibly through civil society organizations selected for the purpose) and it will ensure that women and single women headed households will be prioritized.

x The project will address the improvement of all the drivers of degradation related to the fuelwood value chain.

xi The NDA, FAO and involved stakeholders are also assessing the possibility to introduce in Serbia digital platforms (e.g. <https://www.forestsharing.it/>) that will allow forest smallholders to join forces and enhance the management their plots.

xii The project will give priority to agribusiness (e.g. farms, dairy and meat producers, food processors) and forest-related companies such as (e.g. forest owners, wood processing companies, sawmills) interested in decarbonizing their processes (90% covered by co-financing with market loans) using forests to offset the emissions that cannot be avoided and/or engaging in inseting projects to climate proof their operations and reduce net emissions.

xiii Basel Committee on Banking Supervision. November 2021. Principles for the effective management and supervision of climate-related financial risks.
<https://www.bis.org/bcbs/publ/d530.pdf>

xiv FAO will capitalize here the experience of the [FAO-Investment Center](#) working with key national and international finance institutions with regards to climate derisking, adaptation and mitigation (EU, Uganda National Bank, WB, IFAD, EBRD, CABI, IADB and others).

xv These are the service providers that will support companies in accounting emissions, prepare decarbonization strategies, monitor and verify results and certify offsetting credits and inseting projects.