


Fast-growing tree plantations as solution to face climate change at Zalli i Gjadrit location in Vau Dejes Municipality

Impacts and Lessons from Albania

Date

Connecting Natural Values & People Foundation

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Acronyms

ADA	Austrian Development Agency
CNVP	Connecting Natural Values & People Foundation
GHGs	Greenhouse gases
IFM	Integrated Forest Management
ICEP	Association for Global Development

1 Introduction

The afforestation project at Zalli i Gjadrit, located within the Vau i Dejes Municipality, aimed to restore and enhance the ecological functions of a 2.0-hectare area through the establishment of a new forest stand. By planting a combination of poplar, willow, and ash trees, the project sought to address critical environmental challenges, particularly soil erosion caused by watercourses. This initiative was designed to deliver multiple environmental benefits, including the prevention of soil erosion, regulation of water regimes to mitigate flooding, and the enhancement of carbon sequestration capacity, contributing to climate change mitigation efforts.

One of the key goals of the project was to improve the living standards of the local community by providing employment opportunities through the planting and maintenance of the trees. Local workers, both seasonal and permanent, were employed from nearby villages, thereby supporting the local economy. The involvement of the community in the afforestation efforts was expected to increase their awareness of forest protection and environmental conservation, fostering a sense of ownership and responsibility toward local natural resources.

The environmental impact of the project extended beyond the prevention of erosion and the regulation of water flow. The establishment of the forest stand improved the quality of water in the region by acting as a natural filter, reducing pollutants and impurities before they enter the Gjader River. The presence of trees also supported biodiversity by providing a valuable habitat for local wildlife. The afforestation stabilized the soil, enriching it with nutrients and increasing its capacity to retain water, which enhance the ecological quality of the area.

Collaboration among CNVP, the Forest Staff of the Vau i Dejës Municipality, and the Regional Federation of Forests and Pastures Shkodër ensured the effective implementation of the project. The main objectives were to rehabilitate the forest landscape, expand the forested area with selected tree species, and increase the volume of wood material. Additionally, the project aimed to sequester CO₂, which helped reduce the concentration of greenhouse gases (GHGs) in the atmosphere. The afforestation also promoted groundwater recharge, further enhancing the local water cycle.

During the execution phase, some environmental impacts were anticipated. These included the emissions of greenhouse gases from the use of transportation vehicles and the disturbance of local fauna due to noise generated by the work. However, the project did not use chemical fertilizers, thus avoiding negative impacts on soil and water quality. After the project was completed, the increase in vegetation cover offered multiple environmental benefits, including the improvement of air quality, water retention, and increased biodiversity. The forest biomass created will enhance the forest's ability to absorb greenhouse gases, providing long-term benefits for the local and global environment.

Ultimately, the afforestation project provided both immediate and long-term positive impacts for the local community and the environment. It created valuable employment opportunities, raised awareness of environmental protection, and contributed to the overall ecological health of the region. The success of the project also demonstrated the importance of community involvement in sustainable environmental practices, with lasting benefits for the landscape and ecosystem. Through the collaboration of local stakeholders and environmental organizations, this afforestation project contributed significantly to improving the region's ecological resilience and the well-being of its residents.

2 Background/context

Climate change has significantly intensified the occurrence of extreme rainfall events, posing considerable risks to Vau Dejes region. As climate change continues to progress, these extreme weather patterns are anticipated to become more frequent and intense. Such events can lead to increased flooding, erosion, and disruptions to the local ecosystem. One of the most effective ways to mitigate these impacts is through the establishment of fast-growing tree plantations. These plantations slow the flow of rainwater, absorb excess moisture, and reduce soil erosion, primarily through the expansive root systems of the trees. The role of these plantations in controlling water flow and minimizing land degradation is vital for ensuring the sustainability of the region's natural resources.

The Gjadri River, a crucial water source for the region, is part of the larger Drin River system and serves multiple human needs, including irrigation. Spanning a length of 40.5 km and covering an area of 199 km², the river begins in the northwestern slopes of Bjeshka e Terbunit, flowing through a steep valley and eventually joining the Drin River. The river's basin collects waters from other smaller streams, including the Dibra and Kakri streams, contributing to its hydrological function. Given the importance of the Gjadri River to the local population, maintaining its ecological balance is essential. Fast-growing tree plantations can significantly contribute to this by mitigating soil erosion, regulating water flow, and supporting overall water quality.

The afforestation project site, named Zalli i Gjadrit, is situated within the Vau i Dejes Municipality, in the Drin-Gjader-Kir management unit, covering 2.0 hectares. Located near the Vau i Dejes-Lezhe road, the site lies in a flat area at an average elevation of 24 meters above sea level. The soil at the site consists of Fluvisol, which has developed from alluvial deposits of the Gjadri River's surface waters. The area is characterized by typical Mediterranean vegetation, mainly Graminaceae species, with sparse shrubbery such as *Tamarix* spp.

The primary objective of the afforestation project was to establish a new forest stand by planting species such as poplar, willow, and ash. These species were selected due to their fast growth rates and ability to combat soil erosion. The total cost of the project was 10,583 euros, which covered the costs of planting, maintenance, and aftercare services over a two-year period. By creating this forest, the project aimed to protect the land from erosion, improve water absorption, and support the local community through job creation and increased awareness about forest conservation.

The project area is part of the broader forestry economy of Drin-Gjader-Kir, covering 18.8 hectares, with the 2.0-hectare section designated for afforestation activities. The site's location along the Vau i Dejes-Lezhe highway ensures easy access, and its proximity to the village of Naraç allows for local employment opportunities. The surrounding geological and hydrological features, including sedimentary rock formations and alluvial deposits, contribute to the area's soil structure and water management capacity, which are critical for the afforestation's success.

The hydrology of the site is influenced by the nearby Gjader River and Vomes Stream. However, the construction of hydropower plants, such as the Vrithi and Gjader 3, has altered the natural flow of the stream, particularly during the summer months, reducing water availability for irrigation. This underscores the importance of afforestation, as the trees will help regulate water flow, improve groundwater recharge, and reduce the negative impacts of altered water regimes.

The climate of the region is Mediterranean, with wet winters and dry summers. Annual rainfall ranges between 1340 and 1528 mm, with the majority of precipitation occurring in the winter months. This precipitation pattern, coupled with the site's soil characteristics, makes it well-suited for the afforestation project. The Fluvisol soils, although low in nitrogen and humus, have sufficient organic carbon at deeper layers to support the growth of tree seedlings. The existing vegetation, consisting of grasses and a few shrubs, provides an opportunity for further ecological enhancement through the introduction of trees, which will contribute to soil stabilization, water retention, and biodiversity.

3 Methodology/approach

The afforestation project at Zalli i Gjadrit involved planting a combination of 1556 White Poplar (*Populus alba*) seedlings and 667 White Willow (*Salix alba*) cuttings, spaced 3 meters apart, with the goal of mitigating soil erosion and stabilizing the land. The selection of these species was based on three primary criteria: (i) suitability to the site conditions, (ii) adaptability to climate change, and (iii) the potential benefits for the local community. The species chosen—*Populus alba* and *Salix alba*—were selected for their ecological compatibility with the local environment and their ability to thrive in the area's climatic conditions, as determined by a comparative ecological analysis. This approach focused on aligning the biological characteristics of the species with the environmental conditions of the site, ensuring that the chosen species would be able to adapt and grow successfully. In preparing for the afforestation, a planting scheme was developed based on the species to be used, the site's conditions, and the overall objectives of the project. The site was mapped with a 3.0 m x 3.0 m grid for the planting, ensuring regular spacing between each seedling. The planting formula followed was a ratio of 70% White Poplar to 30% White Willow, chosen to provide an optimal combination of tree species for long-term ecological stability.

The planting process began with soil preparation before the planting season to prevent delays and ensure the health of the seedlings. Any competing vegetation was removed to minimize competition for resources. Two stages of preparation were followed for planting: first, marking the positions for the planting holes, then digging the pits to a depth of 50 cm x 50 cm x 50 cm, based on the site's groundwater level being less than 1.5 meters. This depth was deemed appropriate for the 2-3 year-old seedlings being planted. For each hectare of afforestation, approximately 778 pits were prepared, with each pit dug at least three weeks before planting to allow the soil to settle. When preparing the pits, the topsoil containing more organic material was set aside to fill the bottom of the holes, while the lower-quality soil was placed on top. If the seedling roots were too long, they were pruned to fit the planting depth.

During planting, each seedling was carefully placed in the center of the hole, with high-quality soil used to surround the root system, ensuring proper contact between the soil and roots. After placing the seedlings, the soil was gently compacted to eliminate air pockets, and the root collar was positioned a few centimeters higher than the surrounding soil. Organic fertilizer or humus, at a rate of 50 grams per seedling, was added to support the seedlings' growth. After planting, the holes were watered to ensure the soil was adequately moist and to avoid air pockets around the roots. The expected survival rate was projected to be 70% two years after planting.

Aftercare services were provided over a two-year period to promote optimal growth and ensure the highest possible survival rate. These services included two weedings, two fertilizations, and two irrigations in the first year, followed by one irrigation, one fertilization, and one irrigation in the second year. Weeding was done within a 0.3 m radius around each seedling to a depth of 10-15 cm to remove harmful weeds that could compete for nutrients and water. Weed control was conducted during the months of June to August in 2024 and July 2025. Irrigation was carried out during the afternoon to ensure water absorption by the roots overnight, using water from the nearby river.

To protect the newly planted seedlings, the area was secured from grazing by goats and sheep, and any pest or disease outbreaks were to be managed using appropriate chemical controls. Collaboration with local shepherds and the Vau i Dejes Municipality was key to ensuring proper protection and management of the site. The Vau i Dejes Municipality, as

the project beneficiary, was responsible for overseeing the long-term protection and maintenance of the afforestation site.

Additionally, a table reading "Afforestation Project" was recommended to be placed on the site to increase awareness and visibility of the project. This methodology ensures the afforestation project is carried out efficiently, with a focus on sustainability, community involvement, and long-term ecological benefits.

4 Partners

The realization of the project was achieved through the cooperation of CNVP, the Forest Staff of the Vau i Dejës Municipality, and the Regional Federation of Forests and Pastures Shkodër, representatives of the community".

5 Main results/findings

The afforestation project in Zalli i Gjadrit was expected to have several significant environmental and socio-economic impacts. These impacts include a reduction in land loss due to water erosion, prevention of flooding by regulating water regimes, and an increase in carbon sequestration capacity. Additionally, the project contributed to the creation of a forest stand of ecological and social importance for the local community, while also providing a valuable habitat for local wildlife.

The benefits derived from the afforestation go beyond the direct economic aspects and encompass a range of environmental advantages. Among the most notable are the provision of wood material, increased CO₂ sequestration, regulation of the local climate, control of the water regime and water quality, and the enrichment of the soil with vital nutrients. These contributions align with the project's broader objectives of fostering ecological balance, mitigating climate change, and promoting sustainable land use.

A cost-benefit analysis of the project was conducted to quantify its economic viability. The analysis focused on two key measurable benefits: wood material production and CO₂ sequestration, both of which are integral to the long-term success of the afforestation effort. The economic costs of the project amounted to 10,583 Euros, with an expected revenue generation of 211,503 Euros over the 40-year production cycle of the Poplar trees. This equates to an annual revenue of 5,288 Euros. The project is expected to recover its initial investment in approximately 2.0 years, based on the difference between the investment costs and the expected annual revenue. Over the full 40-year period, the net economic benefit of the afforestation project is projected to be 200,920.27 Euros (211,503 Euros in revenue minus 10,583 Euros in costs).

These results indicate that the afforestation project not only offers substantial environmental benefits but also presents a positive return on investment. The project is poised to contribute to the local community's sustainable development, support wildlife conservation, and play a role in mitigating the impacts of climate change.

6 Lessons learned

Throughout the planning and implementation of the afforestation project, several important lessons have been gained that will inform future efforts and ensure the continued success of similar initiatives.

1. **Importance of Species Selection and Site Suitability:** One of the key lessons learned was the critical role of selecting the right species that are well-suited to the local environmental conditions. The choice of *Populus alba* (*White Poplar*) and *Salix alba* (*White Willow*) was based on the comparative ecological approach, which emphasized the compatibility of the species with the site's conditions and their adaptability to climate change. This careful selection process is essential to ensure the long-term success of the afforestation.
2. **Soil and Planting Pits Preparation:** Adequate preparation of the planting pits and soil is crucial for the successful establishment of seedlings. Properly dug pits and suitable soil conditions contribute significantly to root development and seedling survival. The experience highlighted the importance of timing in preparing these planting sites, ensuring that they are ready well before the actual planting begins.
3. **Minimizing Negative Environmental Impacts:** While some challenges were encountered, such as emissions from transportation and noise disturbances from planting activities, the decision to avoid using chemical fertilizers proved to be beneficial in preserving the quality of the surrounding soil and water. This approach reinforced the importance of sustainable practices in minimizing environmental harm during both the implementation and post-planting phases.
4. **Monitoring and Maintenance:** The necessity of ongoing monitoring and cultural services was a key takeaway. Regularly checking the survival rates of seedlings, addressing weed growth, and providing irrigation and fertilization during the first two years are vital to ensuring the survival and growth of the trees. This proactive approach ensures that the investment made in afforestation yields positive long-term environmental benefits.
5. **Community Engagement and Employment:** The involvement of local workers from nearby villages in the implementation process was an important learning experience. Not only did this contribute to the success of the project, but it also provided economic benefits to the local community. This highlighted the value of community engagement in afforestation projects, both for operational success and fostering positive relationships with the people who will benefit from the project's outcomes.
6. **Risk Mitigation and Adaptability:** Managing risks, such as extreme weather conditions, grazing by livestock, and potential fires, was another key lesson. Implementing protective measures, such as fencing and careful monitoring of environmental factors, can significantly reduce these risks. Moreover, being adaptable and responsive to unforeseen challenges ensures that the project remains on track even when unexpected issues arise.

7 Challenges and opportunities

The afforestation project offers both significant opportunities and challenges, each of which plays a key role in determining the long-term sustainability of the initiative and its potential benefits for the local community and environment.

One of the primary opportunities the project offers is the forest's ability to regulate water flow in the Gjader River, which will have multiple environmental benefits. This includes reducing soil erosion, minimizing sedimentation, and improving groundwater recharge. The trees planted as part of this afforestation initiative will act as natural water filters, absorbing pollutants and impurities from the water before it reaches the river. This filtration process is essential in maintaining the water quality of the Gjader River, thereby

improving the health of the local freshwater ecosystem and contributing to better living conditions for the surrounding community.

Despite these positive opportunities, the project does present some environmental challenges. The transportation of materials and equipment to the site will contribute to greenhouse gas emissions from fuel combustion, adding to the environmental impact of the project. Additionally, the noise generated during the planting and afforestation activities could temporarily disturb local wildlife, potentially causing displacement. To minimize these negative impacts, the project avoids the use of chemical fertilizers, which could lead to soil and water contamination. Instead, a more sustainable approach is being implemented to preserve the quality of the local ecosystem.

Once the project is completed, the long-term environmental impacts are expected to be largely positive. The increase in vegetation cover from the afforestation will significantly enhance ecosystem services, including habitat quality for local wildlife. The newly established forest will provide additional shelter and food for fauna in the area. Soil stabilization will also improve as a result of the afforestation, enriching the soil with vital nutrients. Furthermore, the growth of forest biomass will help absorb more greenhouse gases, contributing to the mitigation of climate change in the region. Overall, the project will lead to a healthier ecological environment, benefiting both the local community and the broader ecosystem.

While the afforestation project holds much promise, several risks must be addressed to ensure its success. Key risks include:

- **Quality of Work and Seedling Quality:** Poorly prepared planting holes and the use of substandard seedlings can negatively affect the survival and growth of the trees. Ensuring proper hole preparation and high-quality seedlings is essential for successful afforestation.
- **Soil Compaction and Improper Planting:** If the soil is too compacted or if seedlings are improperly planted, root development may be hindered, which could result in poor growth and low survival rates.
- **Extreme Weather Conditions:** Unfavorable weather, such as late frosts or extreme heatwaves, poses a significant risk to young seedlings, potentially damaging or killing them before they can establish themselves.
- **Grazing by Livestock:** Grazing animals can pose a serious threat to the seedlings, potentially damaging or destroying them, thus reducing the overall success of the afforestation project.
- **Intentional Damage:** Deliberate harm to the seedlings or the planting site, whether by people or animals, could compromise the success of the project.
- **Forest fires:** Forest fires, either natural or man-made, could destroy large areas of newly planted seedlings, leading to the failure of afforestation efforts.

In addition to environmental challenges, there are also significant opportunities for local economic development through the project. Workers, both seasonal and permanent, will be employed from nearby villages, providing them with economic benefits that will contribute to an improved standard of living and overall quality of life. This local employment not only supports the community but also encourages sustainable engagement with the afforestation project.

8 Conclusions and recommendations

The afforestation project presents significant potential for environmental and community benefits, with its long-term effects contributing to both the health of the local ecosystem and the well-being of the surrounding community. By regulating the water flow in the Gjader River, the newly established forest stand will play a crucial role in reducing soil erosion, minimizing sedimentation, and enhancing groundwater recharge. Moreover, the trees will act as natural filters, removing pollutants and impurities from the water before it flows into the river. This will contribute to maintaining the water quality of the Gjader River, ensuring that it remains clean and healthy, which is vital for both the local community's living conditions and the overall health of the freshwater ecosystem.

While the project faces challenges, including transportation emissions, noise disturbances, and potential grazing risks, these are being carefully managed through sustainable practices, such as avoiding the use of chemical fertilizers. The anticipated positive impacts of the afforestation, including improved habitat quality, soil stabilization, increased carbon sequestration, and enhanced ecosystem services, will far outweigh the temporary challenges encountered during implementation.

In conclusion, the afforestation project represents a significant step toward improving the ecological and economic sustainability of the region, enhancing both the environment and the livelihoods of the local population. With careful management and ongoing monitoring, the project will contribute to a healthier and more resilient ecosystem, while also supporting the local community in meaningful ways.



CONNECTING NATURAL VALUES & PEOPLE



Building a Greener Economic Environment

CNVP operates in the Balkan region. It focuses on natural resource management, forestry, agri-rural development and renewable energy, as well as the impact of climate change on the environment.

As a civil society organisation, CNVP acts as a facilitator to:

- Strengthen community capacity to achieve local development goals;
- Maximise the production and service potential of rural areas through sustainable and locally controlled natural resource management;
- Promote the use of natural resources to improve socio-economic development and rural livelihoods; and
- Conserve the bio-diversity of natural resources at a time of serious environmental and climate change.

Core Values

- **Green** - intervening to build a greener economic environment within the ongoing process of climate change
- **Clean** - promoting renewable energy and improved household/industrial waste management
- **Seen** - operating in the Balkans and the European Neighbourhood Space
- **Lean** - improving the efficiency of service delivery continuously and systematically
- **Committed** - working to achieve sustainable agri-rural and forestry development
- **Innovative** - incorporating new ideas into decision-making processes
- **Team** - sharing responsibility to achieve targeted results

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