



## Community-Based Ecosystem Restoration and Climate Change Adaptation in Afghanistan

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### Abstract

Ecosystems are indispensable support systems crucial for advancing human socioeconomic well-being. However, ecosystem degradation has become a pressing concern in Afghanistan, a landlocked developing country. Rangeland and forest ecosystem degradation have been ongoing here for several reasons, including unsustainable land-use practices, rapid land cover changes, and heavy reliance of rural communities on natural resources due to its weak economy and to meet the needs of the growing population. The situation has further worsened because of climate change, further escalating ecosystem degradation. Even though the country is a low-carbon emitter, it remains vulnerable to the impacts of climate change. A multi-focal project has been under implementation since 2018 by FAO with the financial support of the GEF with an aim to promote integrated community-based interventions for addressing land degradation, promoting sustainable and inclusive forest and rangeland management practices, and providing sustainable livelihoods to rural forest and rangeland dependent communities. This paper describes how local community-based restoration practices have made changes to the natural resources, landscapes, and livelihoods helping communities better adapt to climate change. Community mobilization through Forest Management Associations (FMA) and Rangeland Management Associations (RMA) played a vital role in promoting climate-smart and resilient biodiversity-friendly practices, including improvement of forest management, and adoption of quarantine, rotational, and controlled grazing measures in 230,000 ha of forest and

rangelands. High Conservation Value Forest and rangeland restoration has exceeded the planned targets. Additionally, the management of several other forest types improved resulting in enhanced biodiversity conservation and carbon sequestration of 3,859,904 tCO<sub>2</sub>-e. The results are promising both in terms of climate change mitigation and adaptation while improving the hydrological functions in the ecosystem and contributing to global environmental benefits. Adaptive strategies like transitioning through the provision of fuel-efficient cookstoves for energy conservation further reduced vulnerability and increased community resilience. Active community involvement and enhanced capacity development of local communities in forest and rangeland management is a successful strategy in similar contexts as in Afghanistan.

**Keywords:** climate change adaptation; ecosystem restoration; forest management; rangeland management; resilience; sustainable livelihood; carbon sequestration; community-based management

### Introduction

Ecosystems, comprising interconnected communities of plant, animal, and micro-organisms along with their non-living environment, are vital support systems crucial for the socioeconomic advancement of humanity (CBD, 2024; Najmuddin et al., 2022). However, degradation has emerged as a major challenge in recent decades, particularly in developing countries, primarily due to overexploitation and heavy reliance

on natural resources (FAO, 2015; Khan et al., 2024). In the context of Asia-Pacific, about 64 percent of the forests are secondary and exhibit varying degrees of degradation (FAO, 2019). Likewise, rangelands play a significant role for pastoral and agro-pastoral communities in Asia (Mirzabaev et al., 2016). The population is increasing in this region, which has further implications for degradation.

Addressing degradation through restoration is emerging as a key priority in most countries (FAO, 2019). Restoring ecosystems assists in reducing the impacts of climate change on vulnerable communities, enhances ecosystem benefits, and increases community resilience and adaptive capacity under conditions of climate change (William et al, 2021). A regional strategy and action plan is in place for forest and landscape restoration (FLR) with six strategic priorities including supporting community-level action on FLR (FAO, 2018). To achieve a sustainable future, FAO has drawn attention to seven “robust actions”; putting much more emphasis on maintaining and improving forest quality and restoring degraded landscapes as a key action, (FAO, 2019) which is also relevant to the UN Decade on Ecosystem Restoration.

In Afghanistan, a landlocked developing country in Asia, a multitude of factors including poor governance, political instability, overpopulation, resource overexploitation, land use changes, and the effects of climate change have led to escalating ecosystem degradation over the past two decades (NEPA and UNEP, 2016; Najmuddin et al., 2022). Natural calamities and fragile topography have worsened the situation, intensifying economic vulnerability in a country heavily reliant on its land and natural resources (INDC, 2015). Furthermore, projections predict a 1.5 °C temperature increase by 2050 in Afghanistan, resulting in reduced snow cover, with decreased water availability, further inducing drought and climate sensitivity (GD-NRM, 2017).

While forest and shrublands cover 1.8 million hectares, supplying timber, fuelwood, and non-timber forest products, rangelands cover 30.2 million hectares, directly supporting agribusinesses, and supplying 75 to 80 percent of animal fodder for the majority of the country’s livestock. Forests and rangelands play a crucial role in Afghanistan’s economy and population, sustaining 80 percent of Afghan households and providing various ecosystem services (World Bank, 2018). However, unsustainable land-use practices persist in Afghanistan, driven by the substantial dependence of rural communities on natural resources to meet the demands of a growing population (World Bank, 2023). Environmental stress such as overgrazing, forest deforestation, soil degradation, erosion, water contamination, and climate change further exacerbate land degradation (Shroder, 2012). The average monthly fuelwood use in an Afghan rural family is approximately 800 kg in summer and in winter is 1200 kg (ICIMOD, 2018). Population of Afghanistan is expected to reach 42.4 million by 2030, which was 28.8 million in 2015 and will significantly impact future deforestation (Romijn et al., 2013). Timely restoration of degraded land, conserving and

sustainably managing natural resources and ecosystems are of essence for ecosystem resilience, ensuring food and nutritional security of the growing human population (Dubey et al., 2021).

Restoration, defined as intentional activity that initiates or accelerates ecosystem recovery from a degraded state, offers numerous benefits including soil fertility enhancement, water retention augmentation, and land degradation mitigation (IPBES, n.d.). Moreover, it aids in biodiversity preservation by creating habitats for various organisms, thereby bolstering ecosystem health, carbon sequestration, greenhouse gas emission (GHG) mitigation, and climate change resilience (UNU, 2024). Land restoration plays a pivotal role in combating climate change and enhancing climate resilience. These actions align with international commitments such as the United Nations Convention to Combat Desertification (UNCCD)’s zero net land degradation target, the UN Decade on Ecosystem Restoration goals (ELD-Initiative, 2013; UNEP and FAO, 2024), and restoration targets of Kunming Montreal Global Biodiversity Framework (CBD, 2022).

There are multiple approaches to restoring the ecosystem either by active restoration or by removing degradation which promotes natural regeneration, however, both approaches require good governance, resources and time (FAO, 2022). Community-based restoration is an effective approach to promoting change and enhancing restoration success. This paper underscores the impacts of community-driven restoration efforts on local environments and their role in helping communities adapt to climate change.

## **Materials and Approach**

### **Study Area**

Afghanistan has a diverse landscape, including irrigated plains, fertile river valleys, rugged gorges, deserts, elevated plateaus, and snow-capped mountains scattered over 34 provinces. Different ecological environments spanning from arid deserts to subtropical areas and high alpine regions have facilitated the development of a varied flora in Afghanistan (Bteckle, 2007). Adverse effects of climate change are witnessed, for instance, the precipitation has decreased in Afghanistan by 40.5 mm from March to May (Teimoory et al., 2022; INDC, 2015).

FAO has been implementing a multi-focal project since 2018 with the financial support of the GEF. It has been promoting integrated community-based interventions for halting land degradation, promoting sustainable and inclusive forest and rangeland management practices, and providing sustainable alternative livelihood options. The project activities are being implemented in Badghis, Bamyán, Ghazni, Kunar, and Paktiya provinces until 2026 (Figure 1).

In Badghis province, more than 96% of people live in rural areas with 76% of people depend on agriculture. Forests are increasingly being degraded because of their overuse as a fuelwood source, as well as a shift in land use to arable land.

Pistachio forests are of economic importance in Badghis. Bamyan province has a small population with mostly mountainous terrain, poor agricultural potential, and a large dependency on livestock for livelihoods. In Ghazni province, there are extensive rangelands, a portion of wild almond forests, and a critical dependency on livestock husbandry. Kunar province is predominantly mountainous terrain with extensive cultivated land. The crops grown include wheat, maize, barley,

cotton, paddy, alfalfa clover, brassica, poppy, orchards, and a variety of vegetables (FAO, 2003). However, Paktiya is mostly rural, with the presence of Kuchi tribes across the provinces, who are the nomads of Afghanistan and pastoral communities (Tapper, 2008). The main livelihood source is agriculture and animal husbandry, and the minimal forest cover is under severe degradation.

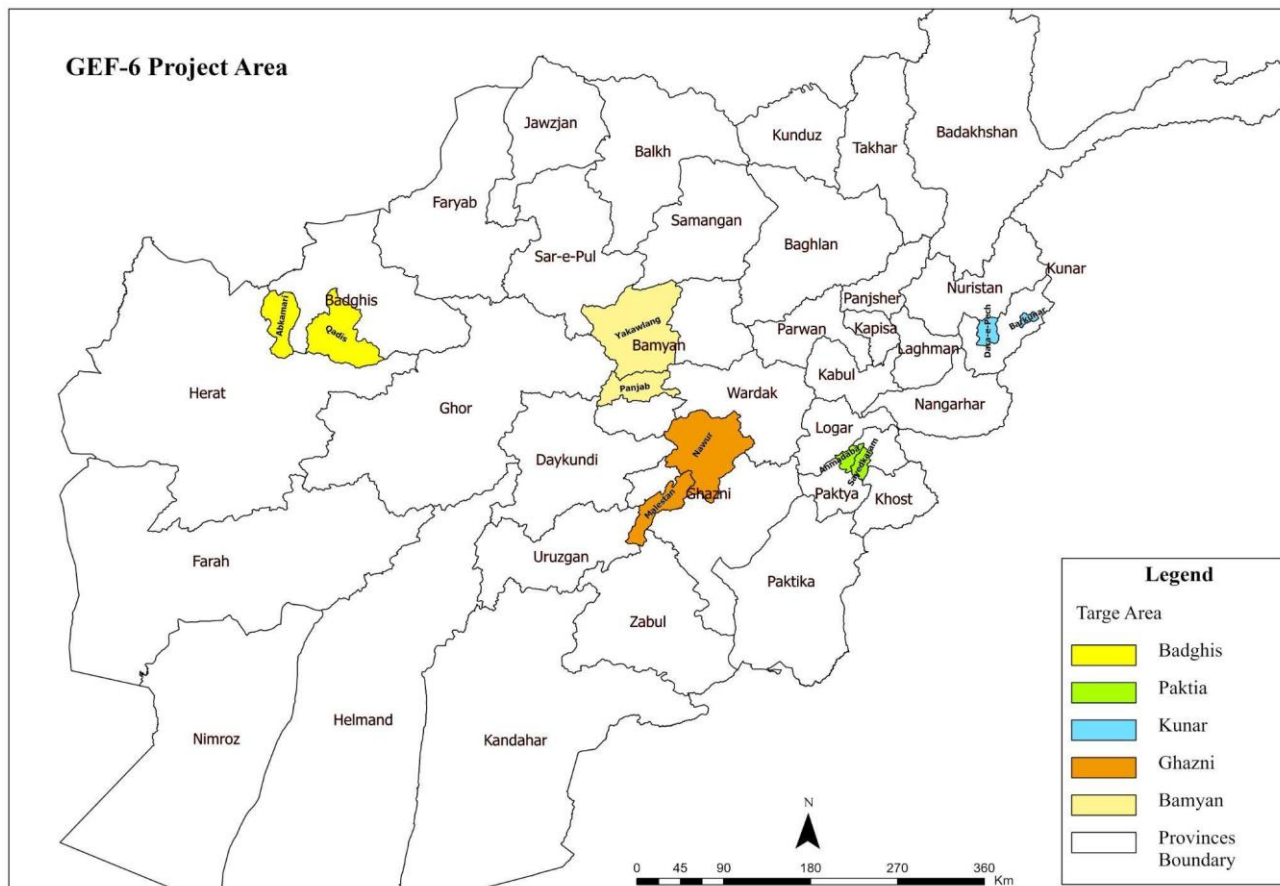


Figure 1: Provinces targeted by the FAO-GEF 6 project interventions

### Approach

Since 2018, communities in the above-mentioned five provinces have been mobilized through 61 Rangeland Management Associations (RMA) and Forest Management Associations (FMA) with the support of FAO. RMA and FMA are legally registered with the government and comprise the people within respective communities who are engaged in the management and conservation of forests and rangelands. The provincial project staff are deployed for field activity implementation in close coordination with the RMA and FMA. They get support from the community facilitators and voluntary members.

The interventions include raising awareness of Sustainable Land Management (SLM) and Sustainable Forest Management

(SFM) at local and provincial levels and designing and implementing climate-resilient interventions in remote rural areas.

### Results and Discussion

Implementation of NRM practices in the project owned by local people helped communities better adapt to climate change. The project built the capacity and advanced climate-resilient and alternative livelihood interventions to conserve water and reduce pressure on existing natural resources; specific results are below.

**Capacity developed on sustainable land and forest management for better adaptation and resilience**

The project achieved progress in terms of policy-level support to counterparts. Progress was also made on capacity building at the national and sub-national level, especially for developing and implementation of Community-based Natural Resource Management (CBNRM) plans in targeted provinces by FMA and RMA. Table 1 highlights the different kinds of

capacity development the project has carried out and the number of beneficiaries.

The capacity development programs were delivered as per gaps and necessities in the community which were identified through a baseline survey. The training focused on key project implementation stakeholders whereas awareness was delivered to all the community members. This is crucial for improving adaptation and resilience in these landscapes.

Type of Programme	Male	Female	Total
Awareness raising	26121	16702	42823
Training of Trainers	87	3	90
Training	4117	1517	5634
Cumulative total	30325	18222	48547

**Table 1:** Different kinds of capacity development programmes on SLM and SFM components and target groups

A gender mainstreaming plan has been developed and implemented at the provincial level. In terms of total capacity development, 18,222 beneficiaries are female, constituting 37.5% of the project beneficiaries.

**Community-based restoration**

FMA and RMA completed multiple restoration practices with FAO’s support. With their commitment and ownership, the project has successfully achieved the restoration of High Conservation Value Forests (HCVFs) and other forest types through afforestation, reforestation, improved management of existing forests, rehabilitation of degraded rangeland through various practices, and design and implementation of alternative livelihood interventions to reduce pressure on natural resources. Restoration, sustainable forest, and rangeland management increased biomass promoted biodiversity conservation, enhanced carbon sequestration, and reduced GHG emissions. Recent studies have also accounted for the benefit of timber production, fuel provision and carbon sequestration from the forestry sector further reducing land degradation in Afghanistan (Gouhari et al., 2021).

Until 2023, 17,790 ha of HCVF has been restored. About 7,490 ha of other degraded forest landscapes were restored through afforestation and reforestation. The management of 10,300 ha of HCVF was improved, including through natural regeneration, controlled grazing, and patrolling practices in the project target areas. The project also helped FMA and RMA to successfully restore 18,325 ha of other forest types. This includes rehabilitation/planting of willow and poplar cuttings for the establishment of woodlots in degraded forest areas in 695 ha.

Also, restoring 17,630 ha through improved management practices like natural regeneration, halting, cuttings, grazing and patrolling in degraded forests in Pakiya, Kunar and Badghis provinces to increase biodiversity conservation and carbon sequestration. HCVF and rangeland restoration have exceeded initially planned targets, mainly due to the commitment of the FMA and RMA, who realized the value of restoration for their lands and lives amidst the challenges they face, including from the changing climate. Recognizing the importance of restoring both farmland and forests is crucial for sustaining life and mitigating the effects of the climate crisis (Khan et al., 2024).



**Figure 2.** Plantation of walnut saplings, Sabray village through Sundray FMA in Kunar province

**Improved livelihood measures for better adaptation and resilience**

The restoration activities in five provinces that positively impacted beneficiaries are listed in Table 2.

Intervention	Number of beneficiaries
Afforestation	1260
Agroforestry	3224
Reforestation	2894
Reseeding	3911
Intercropping	413
Diversified livelihood options (backyard poultry, dairy processing toolkits)	1701
Solar passive-house	181
Fuel-efficient cookstove distribution	9817
Establishment of seed banks and nurseries	218
Constructed water reservoirs and check dams	4420
Stable improvement	250
Woodlots	756
<b>Total Beneficiaries</b>	<b>29045</b>

**Table 2.** Restoration interventions and beneficiaries in five provinces of Afghanistan until 2023

These interventions provided employment, which is a major concern for many, especially the youth in rural areas. The activities include the construction of local structures for water conservation such as the construction of 143 water reservoirs in 1430 ha, and terraces 330 ha in degraded rangeland. The project also helped the construction of 181 solar passive houses, distribution, and adoption of 9817 energy-efficient cooking stoves as well as the establishment of 1701 backyard poultry farms, provision of hygiene tool kits and home-based dairy processing tools to 500 households and upgrading 250 livestock barns/stables to improve the quality of livestock products in remote villages of target provinces. These not only addressed the resource scarcity issues (e.g. better use of scarce wood fuel)

but met alternate income and livelihood needs rather than putting pressure on already degraded forests and rangelands.

29,045 households directly benefited from the restoration interventions from 2018-2023. Similar studies show that planting trees and establishing forests has supported alternative livelihood sources for communities and alleviated land degradation (Gouhari et al., 2021). The communities are enjoying improved food security through agroforestry practices (170,000 saplings, 3,224 households), dairy value chain toolkits (500 households), backyard poultry farms (1,200 households), and cash for work (600 households).



**Figure 3.** A water reservoir constructed in Gundel village and an agroforestry plot in Tarara village of Manogi district.

**Measures in rangelands for better climate change adaptation**

The implementation of rangeland management interventions together with climate-resilient interventions achieved the project result intended in the target areas. Till now,

the project helped improve management practices in 182,637 ha of degraded rangelands in Badghis, Bamiyan, and Ghazni provinces. These practices include direct reseeding of 2,440 ha of degraded rangeland through reseeding of local grasses and rain-fed alfalfa seeds and, other improved management practices such as control grazing, rotational grazing practices,

and quarantine in 180,197 ha of degraded rangeland in project target provinces. These seeds are drought resistance, fast growing, palatable fodder, budget friendly and easily managed. Also, used in winter feeding after drying and assisting in nitrogen fixation and soil stability. Few local grasses are planted which are cheaper and can easily adapt. *Ferula*, which is perennial in nature, has a good market price and high demand in the market.

Native species like *Pinus gerardiana* (Chelghoza), *Juglans regia* (Walnut), *Pistacia vera* (Pistachio) and *Prunus dulcis* (Almond) are selected for plantation because of their adaptive capacity and importance in livelihood support. Chelghoza and Pistachio take around 10-15 years to yield fruits while Walnuts and Almonds are fast growing and take only 4-6 years to yield fruits in these provinces.

Experiences indicate that careful selection of fast-growing species preferred by FMA/RMA that attract high market prices can assist in the livelihood support of vulnerable rural communities. Poplar and Willow, distributed through the project, has good adaptability, short maturity time and can be used for fuel, timber, and fodder purposes. Species used for agroforestry include fruits such as sweet oranges, apples, persimmon, etc. which can generate income. Crops used for intercropping are wheat, maize, fodder, and beans. These crops are also traditionally cultivated by the beneficiaries and are common crops in the project sites. The beneficiaries have highlighted positive results as the intercropping has increased their income.

### Carbon sequestration and other global benefits

Restoration is a key step in mitigating climate change as well; for instance, restoring 350 million hectares of deteriorated land by 2030 could produce ecosystem services worth USD 9 trillion and additionally capture 13-26 gigatons GHG from the atmosphere (UNEP, 2019). The project with the commitments of FMA and RMA has achieved carbon sequestration of 3.86 million tons of tCO<sub>2</sub>e through 226,440 ha of rangeland and forest restoration and improved management. This sequestration is achieved earlier than planned which also reflects that in presence of interest and accountability of communities can help sustainably achieve resource management.

Species such as Poplar and Willow seem to have high carbon sequestration potential; such species selection with communities is also one of the reasons contributing to the earlier sequestration target of the project (Gouhari et al., 2021). Establishing seed banks and nurseries for good quality seedlings and advancing innovative agroforestry models and promoting value addition of forest and rangeland products could help communities derive additional benefits. The restoration activities also provide additional benefits such as improving the hydrological functions in the ecosystem through afforestation and reforestation of (900,000 saplings, in 8,780 Ha), improved management practices in (196,650 Ha), and

construction of water reservoirs (143 infrastructures in 1,430 ha).

The results from the project so far indicate that in Afghanistan, restoration and providing communities with livelihood alternatives has proved to be a successful measure for reducing the pressure on forests and rangelands and improving community resilience to the changing climate. This adds to the growing body of evidence on how restoring degraded ecosystems helps communities adapt to climate change, providing climate adaptation services through ecosystems' increased ability to respond to change (Lavorel et al., 2014). Successful restoration efforts also help communities reconnect with their environment, empower individuals, and foster a mindset focused on both ecological and psychological health (Leigh, 2005; Garcia et al., 2018). Several project initiatives were replicated in adjacent communities beyond the project locations indicating the value communities place on restoring efforts.

Over the years, the combination of rising temperatures and the consequent increase in evapotranspiration nationwide have had adverse effects on the hydrological cycle, agricultural output, and the availability of water resources. (INDC, 2015). The project contributed to addressing these environmental issues while addressing restoration for adaptation and resilience benefits including biodiversity conservation, soil, and water conservation. Successful cases to cope with the fragile ecosystem in countries like Afghanistan should be brought to national, regional, and global attention and action should be taken urgently to sustain the ecosystem services, and livelihood to uplift the economic development. Depending on policies, carbon removals could be used to claim for result-based payment under the REDD+ scheme of the United Nations Framework Convention on Climate Change (Bajaj et al., 2024).

All the above activities and results are monitored with a local-level participatory approach involving project provincial stakeholders, FMA, RMA members, and project staff. In addition, provincial project partners also conducted monitoring visits in the target provinces. The benefits and changes are thus continuously monitored using various tools. For example, SHARP (an FAO climate resilience measurement tool) is incorporated into the project that measure resilience of the target farmers and pastoralists against the effects of climate change.

Afghanistan is one of the lowest emission economies but is highly vulnerable to the impacts of climate change (INDC, 2015). Building the capacity on the ground with the willingness and commitment of RMA and FMA has a key role in terms of increased success of the project. There is a need for additional support as reflected in the INDC, 2015 for Afghanistan to make substantial progress on social and economic fronts while maintaining low per capita GHG emission levels. (INDC, 2015).

## Conclusions

The project has demonstrated the value of building local institutions and enhancing their capacity to bring multifarious benefits that have implications on climate change mitigation and adaptation. The community-based and owned interventions have effective results on landscapes and livelihoods that help vulnerable people cope better with external shocks and crises. Sustaining the capacity built and further replicating good practices for adaptive management among wider stakeholders can help in improving livelihood alternatives to the communities while reducing the pressure on severely degraded forests and rangelands in Afghanistan.

## Recommendations

- Engagement of communities improves sustainability and accountability in terms of natural resources management and provides higher success.
- The alternative livelihood interventions have been very significant in reducing pressure on existing natural resources to some extent.
- Targeted capacity development is crucial for natural resource management.
- The existing value chains needs attention and improvement for sustainability.
- Good practice should be disseminated further for replication in neighboring countries or help in the context of developing countries.

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## Conflict of Interest: No

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