Rangeland after three years of quarantine in Deh Beranj Rangeland Management Association of Qadis district, Badghis, Afghanistan (Shamsulhaq Shams)

# Implementing Site Quarantine to reduce rangeland degradation in the highlands of Badghis (Afghanistan)

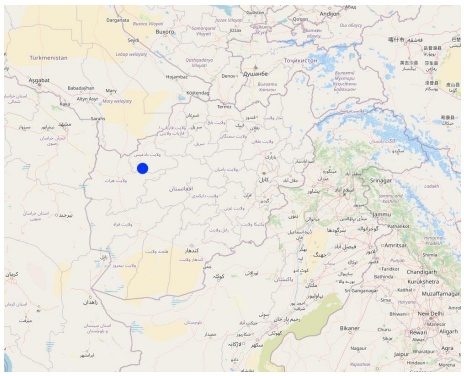
قرنطینه و مدیریت چرا در ارتفاعات بادغیس برای کاهش تخریب مراتع

## DESCRIPTION

**Restoring degraded rangelands through quarantine in Qadis district, Badghis Afghanistan**

The Food and Agriculture Organization (FAO) project of "Community-based sustainable land and forest management in Afghanistan" aimed to promote biodiversity conservation, climate change mitigation, and rangeland productivity through introducing community-based sustainable land and forest management (SLM/SFM) practices in rangeland and forest areas within five targeted provinces, including Badghis, that benefited rural communities that rely on these ecosystems for their livelihood.
In June 2022, a 1,000-hectare rangeland quarantine area was established to promote the rehabilitation of degraded land and restore the natural vegetation cover. This area was strategically enclosed with clearly marked benchmark boundaries to prevent grazing and ensure its complete protection. By protecting this area from human interference and grazing, the land has been given the opportunity to recover naturally.
The quarantine area has shown remarkable improvements in the health of its ecosystem. Native grasses, shrubs, and bushes have successfully rehabilitated, with noticeable growth and regeneration. The efforts to protect this area have allowed these plants to thrive without the pressure of overgrazing, leading to the revitalization of the local flora.
A significant outcome of the quarantine area is its role as a natural seed bank. Native seeds collected from this rehabilitated land are now being stored and used for reseeding other degraded rangelands. These seeds, adapted to the local environment, have high potential for successful regeneration when used to restore other areas facing similar ecological challenges. This process not only supports the rehabilitation of nearby rangelands but also contributes to the long-term sustainability and resilience of the local ecosystem.
The success of this quarantine area highlights the importance of protective measures and demonstrates the potential for land recovery through strategic interventions. As a result, this area serves as both a model for rangeland rehabilitation and a valuable resource for future restoration efforts across the region.

## LOCATION



**Location:** Deh Beranj Rangeland Management Association, Qadis district, Badghis province, Afghanistan

**No. of Technology sites analysed:** single site

**Geo-reference of selected sites**
- 63.35644, 34.74008

**Spread of the Technology:** evenly spread over an area (10.0 km$^2$)

**In a permanently protected area?:** No

**Date of implementation:** 2022; less than 10 years ago (recently)

**Type of introduction**
- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☐ during experiments/ research
- ☑ through projects/ external interventions

Before implementation of quarantine technology (Safiullah Mohammadi)

Regenerated rangeland after implementation of the quarantine technology (Safiullah Mohammadi)

## CLASSIFICATION OF THE TECHNOLOGY

### Main purpose

- [x] improve production
- [x] reduce, prevent, restore land degradation
- [x] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [x] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [x] mitigate climate change and its impacts
- [ ] create beneficial economic impact
- [ ] create beneficial social impact

### Land use

Land use mixed within the same land unit: No

**Grazing land**

- Semi-nomadic pastoralism
- Improved pastures

Animal type: sheep

Is integrated crop-livestock management practiced? No

Products and services: meat, milk

| Species | Count |
|---|---|
| sheep | 50000 |

### Water supply

- [x] rainfed
- [ ] mixed rainfed-irrigated
- [ ] full irrigation

### Purpose related to land degradation

- [ ] prevent land degradation
- [x] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

### Degradation addressed

**soil erosion by water** - Wt: loss of topsoil/ surface erosion

**physical soil deterioration** - Pw: waterlogging

**biological degradation** - Bc: reduction of vegetation cover, Bf: detrimental effects of fires, Bs: quality and species composition/ diversity decline

### SLM group

- area closure (stop use, support restoration)
- pastoralism and grazing land management
- improved ground/ vegetation cover

### SLM measures

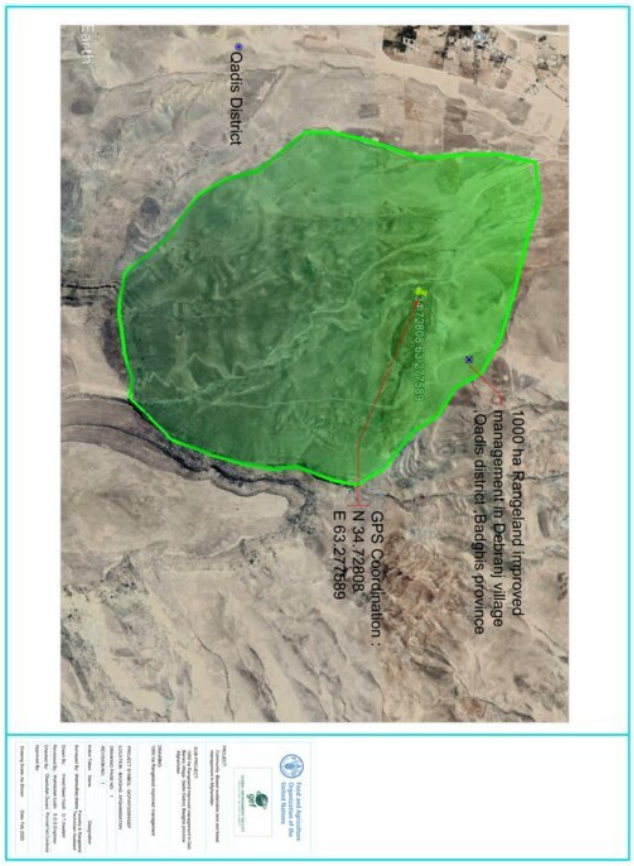
**vegetative measures** - V1: Tree and shrub cover

**management measures** - M5: Control/ change of species composition, M6: Waste management (recycling, re-use or reduce)

## TECHNICAL DRAWING

### Technical specifications

•The green area indicates where grasses regenerated. And the GPS shows the exact quarantined area
•Rangeland quarantine implemented for three years to facilitate the recovery of grasses. By restricting access to degraded areas, we allowed native vegetation to regenerate without disturbance. The grazing exclusion is by social fencing.
•The benchmark is not a fence but functions as one. Constructed from rocks (1 x 1.5 x 2 meters), the benchmarks are placed every 100 to 200 meters around the rangeland quarantine area to clearly mark its boundaries and prevent or control grazing, ensuring the area remains closed off for recovery
•Stakeholder involvement through inclusion of local communities in planning and implementation processes.

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## ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

### Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **1000 Ha**)
- Currency used for cost calculation: **USD**
- Exchange rate (to USD): 1 USD = 75.0
- Average wage cost of hired labour per day: 350 AFN

### Most important factors affecting the costs

Skilled and unskilled labour

### Establishment activities

1. Survey and site selection followed by feasibility study (Timing/ frequency: 1st month 10/04/2022)
2. Preparing construction material like rock (Timing/ frequency: 2nd month 08/05/2022)
3. Construction of benchmark boundaries around the area (Timing/ frequency: 3rd month 01/06/2022)
4. Capacity building of the target communities (Timing/ frequency: 4th month 05/07/2022)
5. Hiring guard for patrolling the area (Timing/ frequency: 5th month 01/08/2022)

### Establishment inputs and costs (per 1000 Ha)

| Specify input | Unit | Quantity | Costs per Unit (USD) | Total costs per input (USD) | % of costs borne by land users |
|---|---|---|---|---|---|
| **Labour** | | | | | |
| Skilled labour for construction of benchmark | person/day | 60.0 | 750.0 | 45000.0 | |
| Unskilled labour for construction of benchmark | person/day | 130.0 | 350.0 | 45500.0 | 100.0 |
| Guard for patrolling the area | person/day | 2.0 | 72000.0 | 144000.0 | 50.0 |
| **Construction material** | | | | | |
| Rock | M3 | 100.0 | 600.0 | 60000.0 | 100.0 |
| **Total costs for establishment of the Technology** | | | | **294'500.0** | |
| *Total costs for establishment of the Technology in USD* | | | | *3'926.67* | |

### Maintenance activities

1. Patrolling the area (Timing/ frequency: All seasons/regular)

### Maintenance inputs and costs (per 1000 Ha)

| Specify input | Unit | Quantity | Costs per Unit (USD) | Total costs per input (USD) | % of costs borne by land users |
|---|---|---|---|---|---|
| **Labour** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Guard for patrolling the area | person/year | 2.0 | 72000.0 | 144000.0 | 50.0 |
| **Total costs for maintenance of the Technology** | | | | **144'000.0** | |
| *Total costs for maintenance of the Technology in USD* | | | | *1'920.0* | |

## NATURAL ENVIRONMENT

**Average annual rainfall**
- [x] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

**Agro-climatic zone**
- [ ] humid
- [ ] sub-humid
- [x] semi-arid
- [ ] arid

**Specifications on climate**
Average annual rainfall in mm: 250.0
Winter (January, February, March)
Dry periods start from May till November
Annual temperature is 25 degrees

**Slope**
- [ ] flat (0-2%)
- [ ] gentle (3-5%)
- [ ] moderate (6-10%)
- [x] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

**Landforms**
- [ ] plateau/plains
- [ ] ridges
- [x] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [ ] valley floors

**Altitude**
- [ ] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [x] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

**Technology is applied in**
- [ ] convex situations
- [x] concave situations
- [ ] not relevant

**Soil depth**
- [ ] very shallow (0-20 cm)
- [x] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

**Soil texture (topsoil)**
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [x] fine/ heavy (clay)

**Soil texture (> 20 cm below surface)**
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [x] fine/ heavy (clay)

**Topsoil organic matter content**
- [ ] high (>3%)
- [ ] medium (1-3%)
- [x] low (<1%)

**Groundwater table**
- [ ] on surface
- [ ] < 5 m
- [ ] 5-50 m
- [x] > 50 m

**Availability of surface water**
- [ ] excess
- [ ] good
- [x] medium
- [ ] poor/ none

**Water quality (untreated)**
- [x] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

*Water quality refers to: both ground and surface water*

**Is salinity a problem?**
- [ ] Yes
- [x] No

**Occurrence of flooding**
- [ ] Yes
- [x] No

**Species diversity**
- [x] high
- [ ] medium
- [ ] low

**Habitat diversity**
- [ ] high
- [x] medium
- [ ] low

## CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

**Market orientation**
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [ ] commercial/ market

**Off-farm income**
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

**Relative level of wealth**
- [ ] very poor
- [x] poor
- [ ] average
- [ ] rich
- [ ] very rich

**Level of mechanization**
- [x] manual work
- [ ] animal traction
- [ ] mechanized/ motorized

**Sedentary or nomadic**
- [ ] Sedentary
- [x] Semi-nomadic
- [ ] Nomadic

**Individuals or groups**
- [ ] individual/ household
- [x] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

**Gender**
- [ ] women
- [x] men

**Age**
- [ ] children
- [ ] youth
- [x] middle-aged
- [ ] elderly

**Area used per household**
- [x] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

**Scale**
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

**Land ownership**
- [ ] state
- [ ] company
- [x] communal/ village
- [ ] group
- [ ] individual, not titled
- [ ] individual, titled

**Land use rights**
- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [ ] individual

**Water use rights**
- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [ ] individual

**Access to services and infrastructure**

| | | |
|---|---|---|
| health | poor | good |
| education | poor | good |
| technical assistance | poor | good |
| employment (e.g. off-farm) | poor | good |
| markets | poor | good |
| energy | poor | good |
| roads and transport | poor | good |
| drinking water and sanitation | poor | good |
| financial services | poor | good |

## IMPACTS

### Socio-economic impacts

fodder production

decreased — increased

Quantity before SLM: 500 kg fodder/ hectare
Quantity after SLM: 900 kg fodder/hectare
Preventing overgrazing helps maintain plant cover and allows for recovery periods, leading to increased biomass production.

animal production

decreased — increased

Quantity before SLM: 0.5 liter per sheep/day
Quantity after SLM: 1 liter per sheep/day
Enhancing the quality and availability of forage provid sheep with a more nutritious diet, which directly impacts milk production.

drinking water quality

decreased — increased

Quantity before SLM: Contaminated water with minerals
Quantity after SLM: Leading to clearer and cleaner water
Effective rangeland management practices enhance the overall health of the ecosystem, leading to improved drinking water quality through better infiltration due to better soil cover and less water runoff.

### Socio-cultural impacts

food security/ self-sufficiency

reduced — improved

Sustainable rangeland management supports local economies by providing livelihoods through livestock production, which can improve food access and self-sufficiency in communities.

health situation

worsened — improved

Quantity before SLM: Less nutritious animal products
Quantity after SLM: More nutritious animal products
Enhanced forage quality leads to healthier livestock, which provides better quality meat and dairy products, contributing to improved nutrition for communities.

SLM/ land degradation knowledge

reduced — improved

Quantity before SLM: Little capacity building
Quantity after SLM: Capacity building for 500 members of the Rangeland Management Association
Training programs for farmers and land managers, increasing their knowledge about sustainable practices and land conservation techniques.

### Ecological impacts

surface runoff

increased — decreased

Rangeland improvement practices can significantly reduce surface runoff, enhance soil health, and improve water quality

excess water drainage

reduced — improved

More efficient excess water drainage, enhancing soil structure, reducing waterlogging, and promoting overall ecological health.

soil cover

reduced ✓ improved

Quantity before SLM: 20% soil cover
Quantity after SLM: 80-90% soil cover
Enhanced vegetation cover leads to healthier ecosystems, improved soil conditions, and increased biodiversity.

vegetation cover

decreased ✓ increased

Quantity before SLM: 20%
Quantity after SLM: 80-90%
Enhanced vegetation cover leads to healthier ecosystems, improved soil conditions, and increased biodiversity

biomass/ above ground C

decreased ✓ increased

Quantity before SLM: 20-30% biomass
Quantity after SLM: 80-90% biomass
Rangeland improvement practices significantly boost biomass and above-ground carbon levels, enhancing ecosystem productivity and contributing to carbon sequestration efforts.

plant diversity

decreased ✓ increased

Quantity before SLM: 60/plants per square meter
Quantity after SLM: 200/plants per square meter
Enhanced plant diversity leads to healthier ecosystems, increased resilience, and improved overall productivity.

drought impacts

increased ✓ decreased

Quantity before SLM: 500 kg fodder/ha
Quantity after SLM: 800 kg fodder/ ha
Rangeland improvement practices significantly mitigate the impacts of drought, enhancing soil moisture retention, vegetation resilience by enhancing the land's ability to retain moisture and support vegetation growth, and overall ecosystem stability.

emission of carbon and greenhouse gases

increased ✓ decreased

Quantity before SLM: 80000 m3/ winter season
Quantity after SLM: 20000 m3/ winter season
Healthy, diverse plant communities capture and sequester more carbon dioxide through photosynthesis, contributing to greater carbon sequestration and contributing to climate change mitigation efforts.

**Off-site impacts**

downstream flooding (undesired)

increased ✓ reduced

Quantity before SLM: 10-12 times /year
Quantity after SLM: Zero floods per year
Risk and impact of downstream flooding is significantly reduced by enhancing vegetation cover, improving soil health, and promoting better water management.

impact of greenhouse gases

increased ✓ reduced

Quantity before SLM: 20 tons CO2 removed/year
Quantity after SLM: 50 tons CO2 removed/year
Healthy rangelands help absorb more carbon in plants and soil, which lowers the amount of $CO_2$ in the atmosphere. When these lands are grazed properly, they allow perennial and annual grasses to regrow. This regrowth not only captures more carbon but also improves soil health.

## COST-BENEFIT ANALYSIS

**Benefits compared with establishment costs**

Short-term returns: very negative ✓ very positive
Long-term returns: very negative ✓ very positive

**Benefits compared with maintenance costs**

Short-term returns: very negative ✓ very positive
Long-term returns: very negative ✓ very positive

Improved rangelands often lead to higher forage yields, supporting larger and healthier livestock populations. This can result in increased income for land users.

## CLIMATE CHANGE

**Gradual climate change**

annual temperature decrease: not well at all ✓ very well
annual rainfall increase: not well at all ✓ very well

**Climate-related extremes (disasters)**

local windstorm: not well at all ✓ very well
heatwave: not well at all ✓ very well
drought: not well at all ✓ very well
flash flood: not well at all ✓ very well

## ADOPTION AND ADAPTATION

**Percentage of land users in the area who have adopted the Technology**

- [x] single cases/ experimental
- [ ] 1-10%
- [ ] 11-50%
- [ ] > 50%

**Of all those who have adopted the Technology, how many have done so without receiving material incentives?**

- [x] 0-10%
- [ ] 11-50%
- [ ] 51-90%
- [ ] 91-100%

**Has the Technology been modified recently to adapt to changing conditions?**

- [ ] Yes
- [x] No

**To which changing conditions?**

- [ ] climatic change/ extremes
- [ ] changing markets
- [ ] labour availability (e.g. due to migration)

## CONCLUSIONS AND LESSONS LEARNT

**Strengths: land user's view**

- Rangeland quarantine allow for better management of pasture resources leading to improved pasture and grass quality.
- Rangeland quarantine increased productivity can maximize the land's carrying capacity leading to higher livestock productivity per unit area.
- Rangeland quarantine helps prevent overgrazing, reduces parasite loads, minimizes soil compaction, and allows for more natural feeding behaviors, all of which contribute to overall animal health.
- Reduce greenhouse gas emissions through carbon sequestration.
- Properly managed rangeland quarantine can promote biodiversity by creating varied habitats and supporting a range of plant and animal species.
- Implementing rangeland quarantine can lead to knowledge transfer among farmers, researchers, and agricultural extension services, fostering innovation and best practices in sustainable land management.

**Strengths: compiler's or other key resource person's view**

**Weaknesses/ disadvantages/ risks: land user's viewhow to overcome**

- Ensuring the right number of animals on each grazing area can be challenging, leading to risks of overgrazing or underutilization. Stocking rate management.
- Rangeland quarantine can lead to social conflicts among different user groups, such as conflicting interests between livestock owners, conservationists, and indigenous communities. Facilitating dialogue among stakeholders, promoting collaborative rangeland management approaches, respecting traditional land tenure systems, and fostering community-based conflict resolution mechanisms can help manage.

**Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome**

- When grazing animals are quarantined, their numbers may increase in certain areas, leading to overgrazing. This can result in habitat degradation and loss of plant diversity. Implement managed grazing systems to control population densities and prevent overgrazing. This can include rotational grazing practices.

## REFERENCES


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**Full description in the WOCAT database**
https://qcat.wocat.net/en/wocat/technologies/view/technologies_7459/
Video: https://player.vimeo.com/video/1065379815

**Linked SLM data**
Approaches: Quarantine and control grazing in the highlands of Badghis to reduce rangeland degradation
https://qcat.wocat.net/en/wocat/approaches/view/approaches_7467/

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