PASTURE MANAGEMENT PLAN

FOR

THE CHACHUNA MANAGED RESERVE

-

A RECOMMENDATION FOR THE AGENCY OF PROTECTED AREAS

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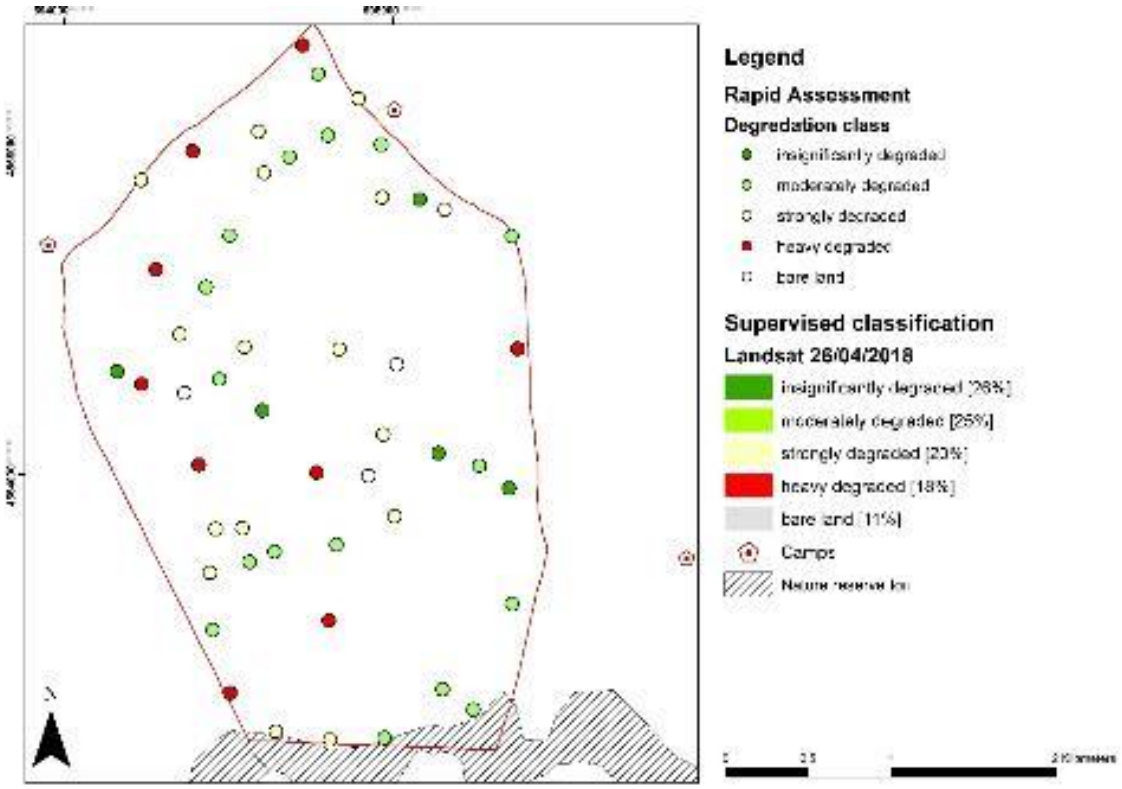
1 INTRODUCTION

The overall objective of the presented pasture management recommendations is to provide estimated stocking rates and a provisional rotational grazing scheme for the pasture area of the Chachuna Managed Reserve. The plan should serve a basis for a future leasing contract that meets the requirements of a protected area.

2 METHODS

2.1 INVENTORY OF DEGRADATION

In order to get an objective and representative view of the pastures, 50 survey plots were randomly distributed within the territory. Thereby, the degradation was visually appraised according to a 5-rate degradation key (Figure 1 to Figure 5) on an area of 2.5x2.5m, whereas degradation class 1 was not identified on site. The sampling was carried out in April 2018. The degradation rates of surveyed plots were used as ground truth data for the SAVI (Soil Adjusted Vegetation Index) classification of Sentinel 2B satellite imageries from 24. April 2019 with a resolution of 10x10m. In course of the classification process degradation class 3 were deleted because of missing significant difference to other classes. Thus, the degradation classes were transformed to following more general classes: Good, Degraded, Critical and Bare land.



Map 1 Location of the assessment plots (samples taken in April 2019).

Figure 1. Degradation class 1 = not degraded

Figure 2. Degradation class 2 = insignificantly degraded

Figure 3. Degradation 3 = moderately degraded

Figure 4. Degradation 4 = strongly degraded

Figure 5. Degradation 5 = heavily degraded

Figure 6. Bare land

2.2 NORMS OF LOADING AND CARRYING CAPACITY

Heads were used for calculating the norms of loading per hectare. One head corresponds to a live weight of 35 kg. According to Table 1 (Gudushauri 1963 in ACTA Consultants Georgia 2007) a loading norm of around 3 heads/ha for winter pastures, whereas Sarjveladze (2014) suggested the equivalent of only one mother sheep per hectare. His calculations were based on the average amount of 260kg feeding units per hectare and year. Considering seasonal different feeding units, one mother sheep needs around 180kg per year. Exploiting the average amount of 260kg, one even could load pastures with 1.5 heads/ha. This value is within the range of the recommended grazing guidelines for traditional use zones and protected areas (c.f. Table 2). It is obvious that there are various stocking rates according to different authors, whereas there is a general lack of differentiations according to different degradation rates. Thus, following stocking rates were applied:

Dense Vegetation and tree cover → 2 heads/ha

Good → 4 heads/ha

Degraded → 1.5 heads/ha

Critical → 0.5 heads/ha

Bare soil/ Badland → 0 heads/ha

Table 1: Norms of loading on pastures, as per 1963 (Source: Gudushauri 1963, ACTA Consultants Georgia 2007)

Norms of loading on winter pastures per 1 ha	
ram (40 kg)	3
dam (30-35 kg)	3
lamb (under 1 year)	7.5
yearling (from 1 to 2 years)	6

Table 2: Recommended grazing guidelines for traditional use zones and protected areas (ACTA Consultants Georgia 2007)

Loading norms on winter pastures per ha	
Ram (40 kg)	1
Ewe (30-35 kg)	2
Lamb (less than 1 year)	6
Yearling (from 1 to 2 years)	5

2.3 ROTATIONAL GRAZING

Rotational grazing uses the time sequence of grazing and recovery periods within different sub pastures (c.f. Figure 8). For the surveyed pilot pastures, the subunits were defined according to topographical situation and landmarks such as roads and ravines. In order to estimate the grazing days, the carrying capacity (c.f. 2.2) for each single subunit was calculated based on the area, the expansion of degradation obtained by field sampling and the areal extrapolation by the SAVI classification (c.f. Chapter 2.1 and Map 2). In course of a rational and sustainable grazing management, these theoretical considerations have to be annually monitored on site. Especially recovery periods and growth rates (Figure 7) highly depend on various alternating variables such as season, climate, vegetation cover, livestock diet and stocking rates. Consequently, it is up to the land user, respectively shepherds to balance grazing and recovery periods. Considering a grazing period of around 150 days, the grazing scheme was designed for 2 cycles à 75 days.

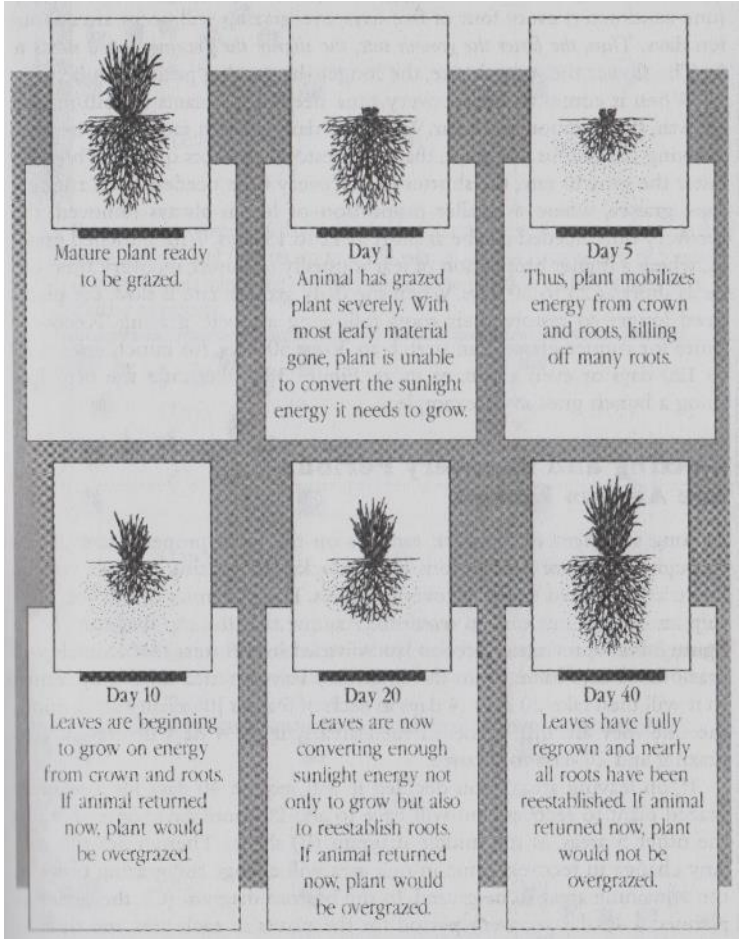
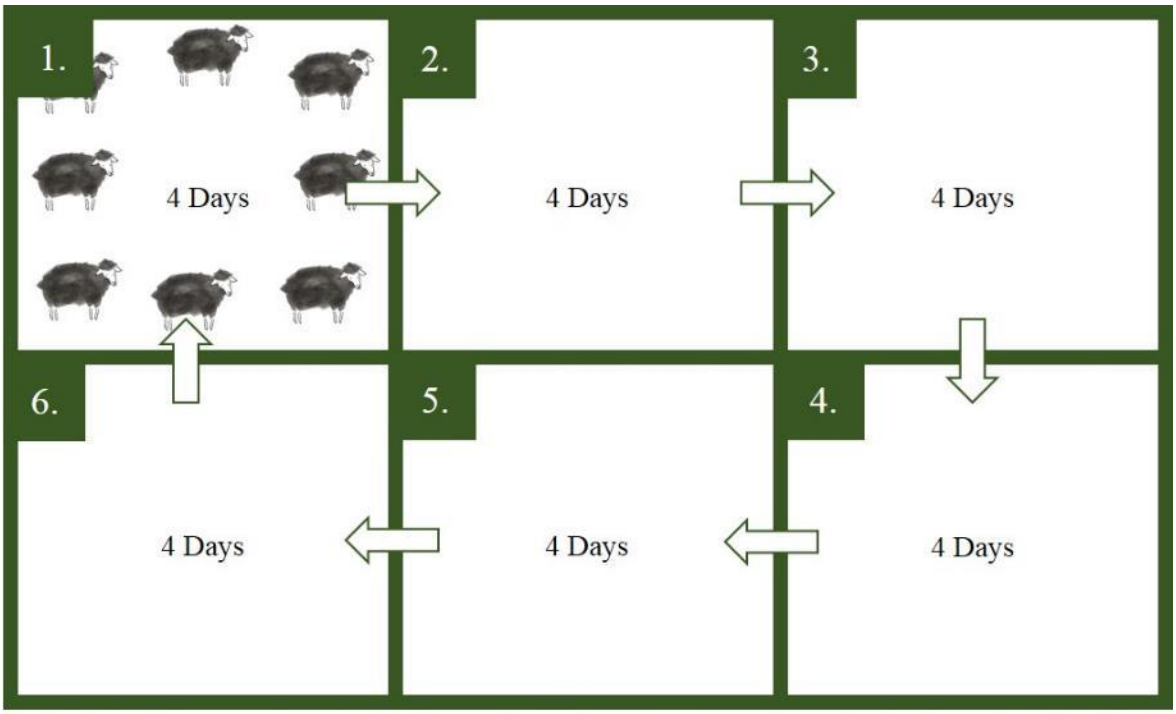
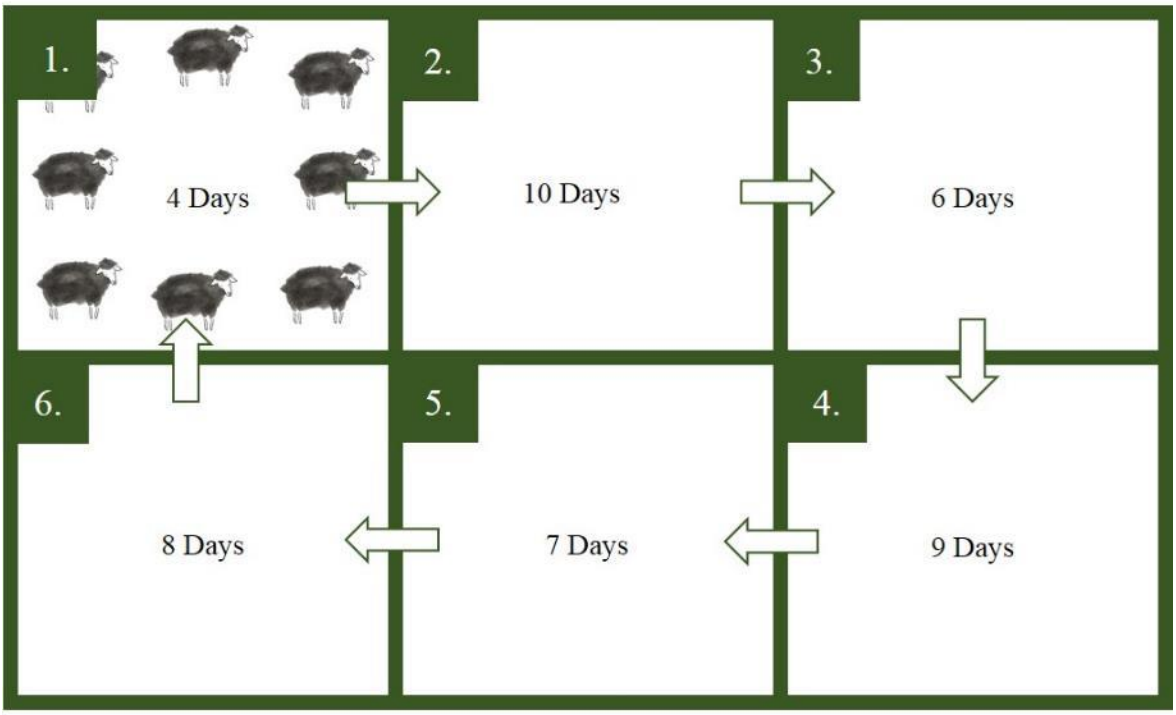


Figure 7. To avoid overgrazing, monitor daily growth rates (Savory & Butterfield 1999, Gebhardt 2015)



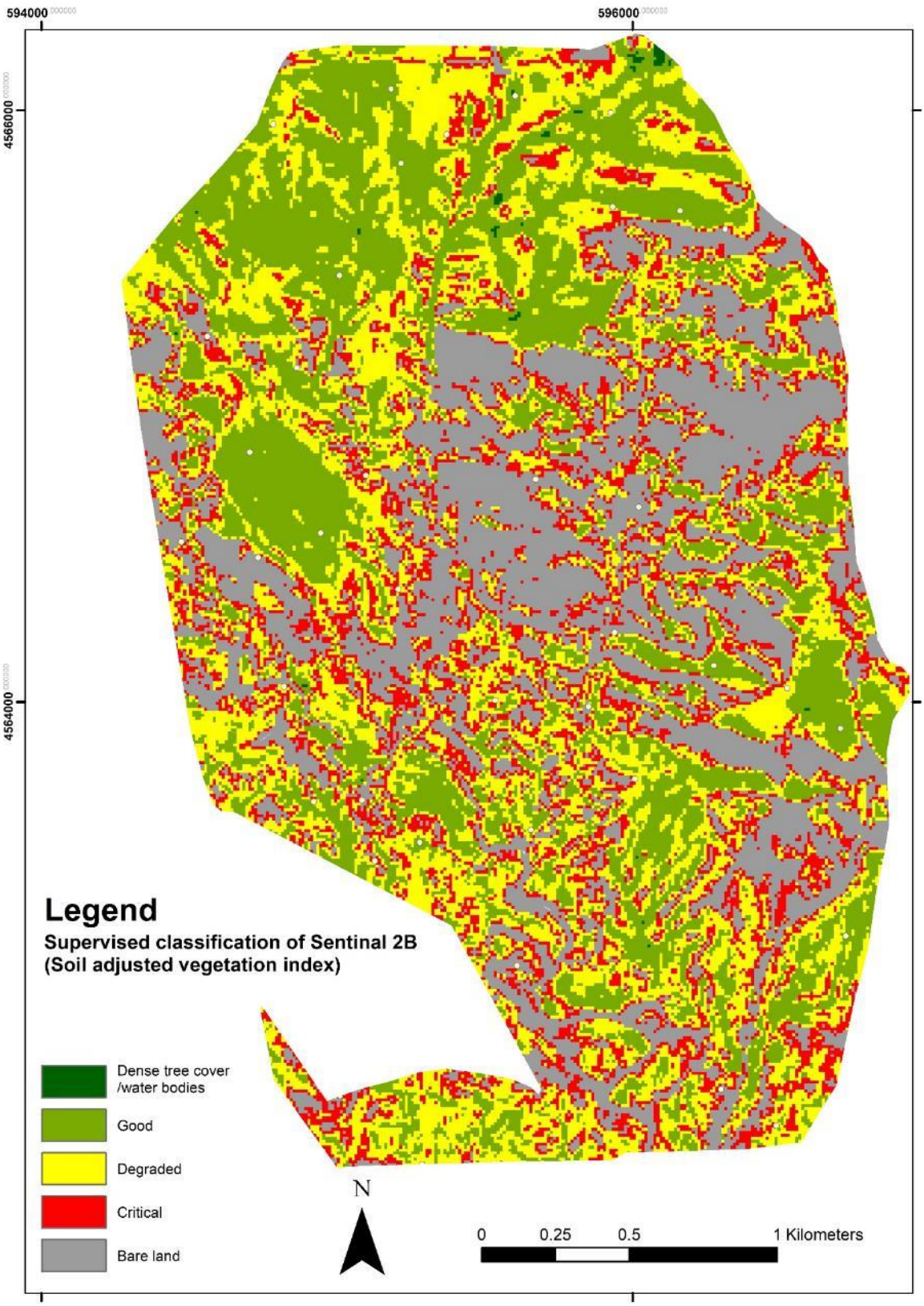
If animals are to spend 4 days in each of 6 grazing areas, then from the time they leave an area until they return to it will take 20 days – 4 days in each of 5 areas (6 grazing areas minus the one they are in). The plants in each area thus have 20 days to recover.



If, on leaving area 1 you decided it would require 40 days for a severely grazed plant to recover, you would have to add 20 more days somewhere in the other five areas (10+6+9+7+8 = 40 days

Figure 8. Rotational grazing system. Grazing periods and recovery periods are linked. Any change in grazing time in one area will change the recovery times in all remaining areas. Figure was modified according to Holistic Management (Savory & Butterfield 1999, Gebhardt 2015).

3 CURRENT EXTEND OF DEGRADATION



Map 2 Pasture condition based on a supervised classification of Sentinel 2B (24/05/2019) soil adjusted vegetation index

Table 3. Land Cover and Degradation for pasture in percent (April 2019)

Area [ha]	Land Cover and Degradation [%]				
	Dense tree cover or water bodies	Good	Degraded	Critical	Bare land
748	2.1	28.9	31.2	7.5	30.2

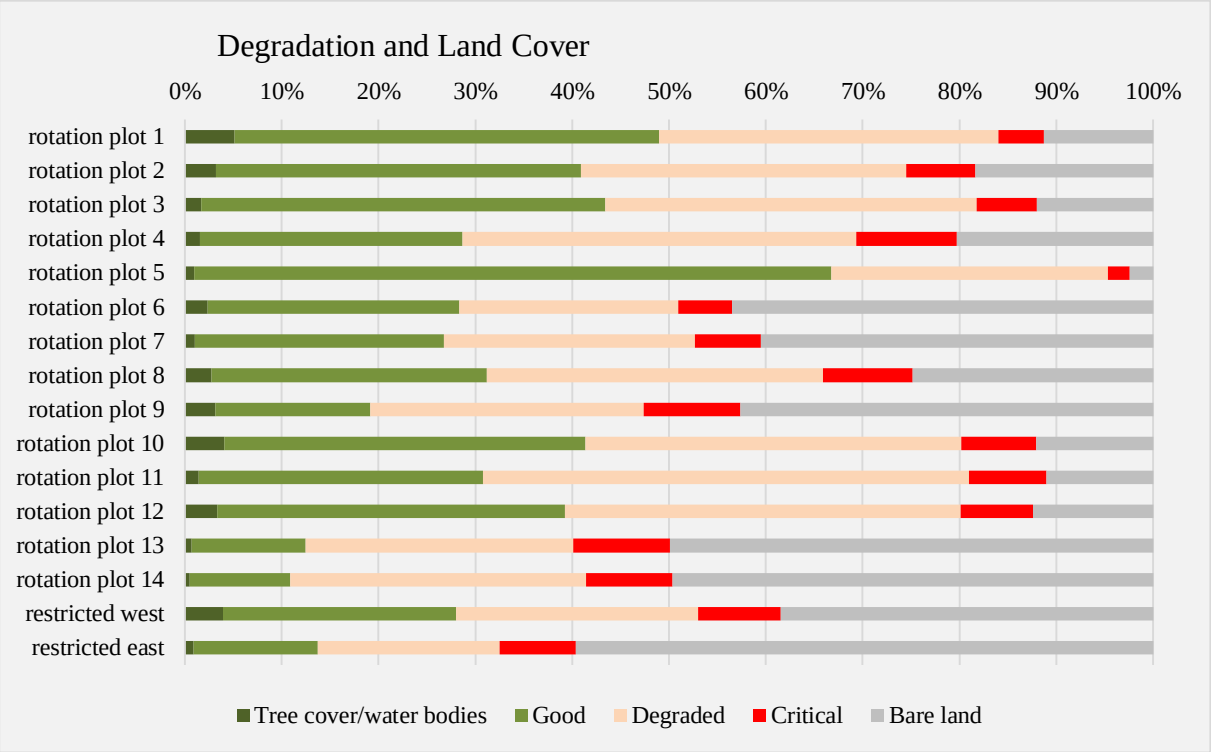
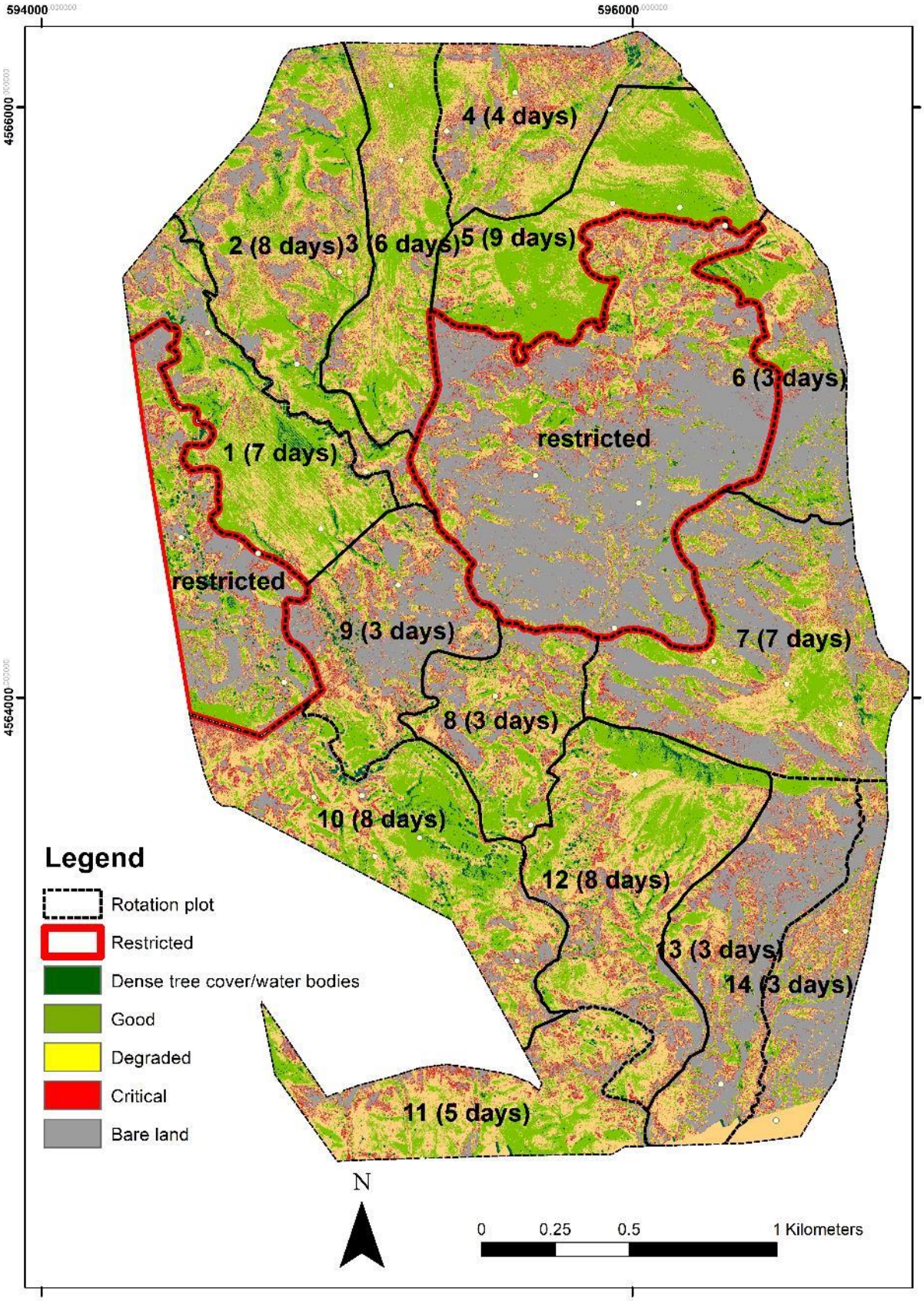


Figure 9 Degradation and land cover for different rotation units (April, 2019)

4 RECOMMENDATION ON STOCKING RATE AND ROTATIONAL GRAZING SCHEME

Table 4 Rotational grazing scheme and underlying variables. Grazing sequence and days are also dis-played in Map 3

Name	Total Area [ha]	Land Cover and Degradation [ha]					Sheep	Grazing days
		Tree cover/water bodies	Good	Degraded	Crritical	Bare land		
rotation plot 1	41.9	2.1	18.4	14.7	2.0	4.7	101	7
rotation plot 2	56.1	1.8	21.1	18.9	4.0	10.3	118	8
rotation plot 3	36.9	0.6	15.4	14.1	2.3	4.4	85	6
rotation plot 4	33.8	0.5	9.2	13.8	3.5	6.9	60	4
rotation plot 5	44.2	0.4	29.1	12.6	1.0	1.1	137	9
rotation plot 6	28.5	0.7	7.4	6.4	1.6	12.4	41	3
rotation plot 7	66.8	0.7	17.2	17.3	4.6	27.0	98	7
rotation plot 8	28.3	0.8	8.0	9.8	2.6	7.0	50	3
rotation plot 9	37.0	1.2	5.9	10.5	3.7	15.8	44	3
rotation plot 10	52.6	2.1	19.6	20.4	4.1	6.3	115	8
rotation plot 11	39.9	0.6	11.7	20.0	3.2	4.4	80	5
rotation plot 12	58.7	2.0	21.1	24.0	4.4	7.3	126	8
rotation plot 13	41.9	0.3	5.0	11.6	4.2	20.9	40	3
rotation plot 14	26.0	0.1	2.7	7.9	2.3	12.9	24	2
restricted west	37.9	1.5	9.1	9.5	3.2	14.6	Exclusion	
restricted east	117.8	1.0	15.1	22.2	9.3	70.2		
Territory Total	748.1	16.3	216.0	233.6	55.9	226.2	**1120**	75



Map 3 Rotational scheme with degradation rates

5 RECOMMENDATIONS ON EROSION CONTROL

Figure 10 "The Gully Valley" with a network of deep ditches

Large areas of the study area is traversed by deep gully erosion processes. Resulting ditches can reach depths up to 6 meters (Figure 10). During heavy rainfall events, the rates of the retrogressive erosion are tremendous. The underlying factors for the erosion rate are schematically displayed in Figure 11.

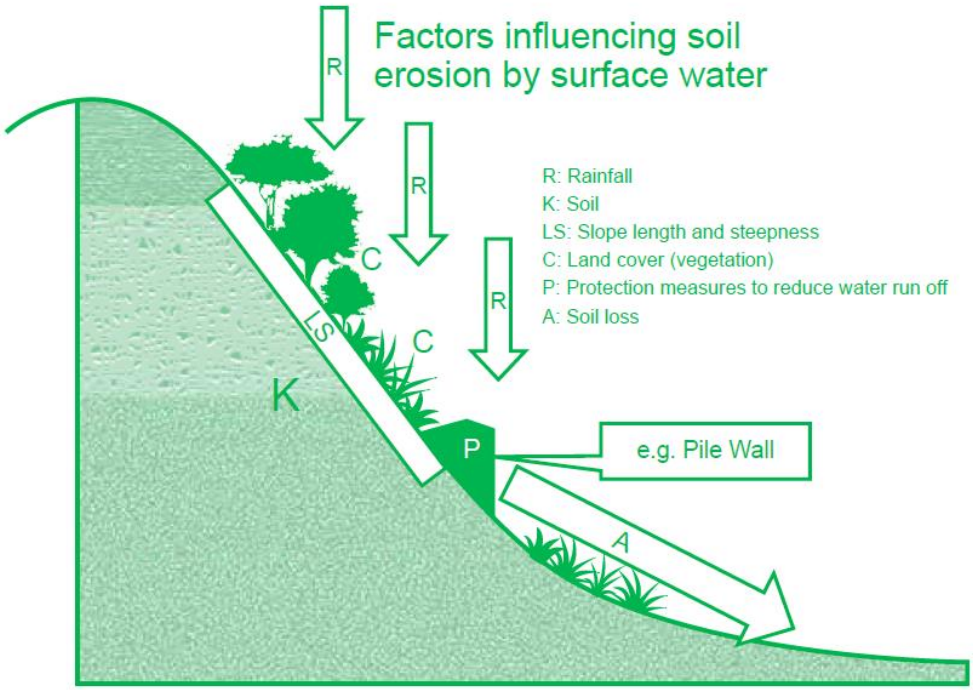


Figure 11 Factors influencing soil erosion caused by rain and surface runoff (GIZ 2018)

The Figure is taken from the “Handbook on Integrated Erosion Control.” (GIZ, 2018). Although it was drafted for Armenia, the described measures are also applicable for Chachuna. We strongly recommend to use gully plugging to reduce the erosion effective slope length in deeply eroded gullies.

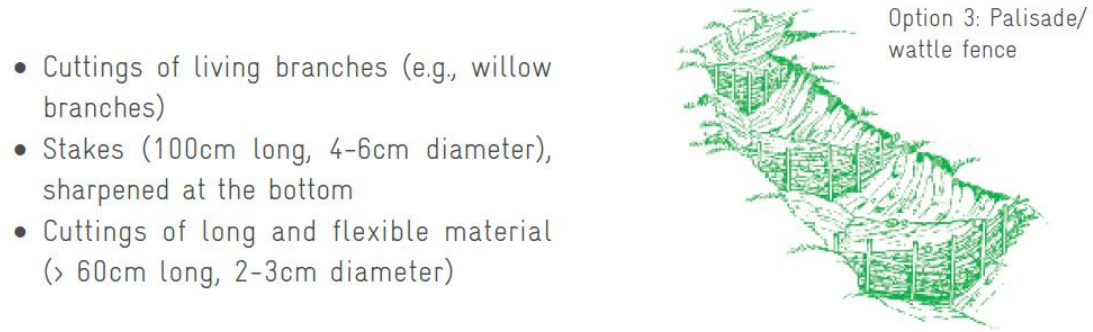


Figure 12 One selected gully plugging method (GIZ, 2018)

To reduce the general surface runoff of degraded land (e.g. inside the restricted area east), we recommend further to increase the vegetation cover by spreading two years old sheep manure (waste product around the shepherd camps) and local hay that will provide an autochthonous seed bank. Prior, animal trampling parallel to the slope under wet soil circumstances (shortly after rain) can help working the ground. The hoof prints serve as water, respectively nutrient collectors and reducing surface runoff (. Especially the last method to reduce erosion requires precise timing and close cooperation with the local land users.

Figure 13 Freshly growing grass in a hoof print of a horse showing the importance of creating micro habitats for spreading seeds.

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