



Sustainable Land Management in Practice

Guidelines and Best Practices
for Sub-Saharan Africa

FIELD APPLICATION

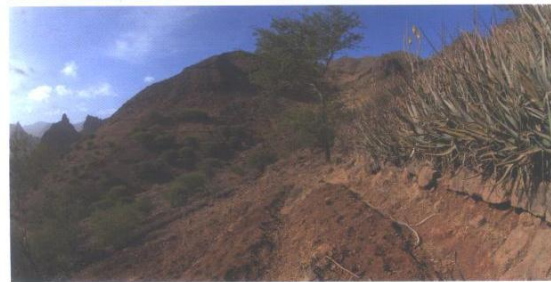
2011

Prepared by WOCAT
Coordinated by the FAO of the UN
A TerrAfrica Partnership Publication

Aloe vera is a drought tolerant, fleshy plant which is planted in the form of live barriers to recuperate degraded slopes on the Cape Verde Islands. The plants are closely planted along the contour to build an efficient barrier for retention of eroded sediments and surface runoff. The hedgerows stabilise the soil, and increase soil humidity by improving infiltration and soil structure. Soil is accumulating behind the *Aloe* strips and slope angle is considerably reduced over time. Groundwater is recharged indirectly. Soil cover is improved, and thus evaporation reduced.

Implementation is relatively simple. The contour lines are demarcated using line- or water-levels. Seedlings are planted at a distance of 30-50 cm between plants; Spacing between the rows varies between 6-10 m according to the slope. The technology is applied in subhumid and semi-arid areas, on steep slopes with shallow soils, sparse vegetative cover and high soil erosion rates. These areas are generally used by poor subsistence farmers for rainfed agriculture with crops such as maize and beans, which are considered inappropriate for such slopes. On slopes steeper than 30% the live barriers are often combined with stone walls (width 40-50 cm; height 80-90 cm). The plants stabilise the stone risers, making this combined technology one of the most efficient measures for soil erosion control on Cape Verde.

Aloe vera is well adapted to the local biophysical conditions and to the prevailing land use system: it can be used with any crop and is available to all farmers; establishment and transport is simple, its leaves are not palatable to livestock, the plant is extremely resistant to water stress and grows in any bioclimatic zone on the island. Furthermore, *Aloe vera* is known for its multiple uses in traditional medicine.



SLM measure	Vegetative
SLM group	Cross-Slope Barriers
Land use type	Annual cropping (maize, beans)
Degradation addressed	Soil erosion by water
Stage of intervention	Mitigation and rehabilitation
Tolerance to climate change	Tolerant; <i>Aloe vera</i> is resistant to water stress, and establishes well in different climatic zones

Establishment activities

1. Demarcation of contour lines, using line or water levels; spacing between barriers is minimum 6 meters (early June).
2. Collection of *Aloe vera* plants; *Aloe vera* is growing naturally in abundant quantity on the upper slopes, in depressions / hollows, in arid as well as in more humid zones.
3. Planting of *Aloe vera* seedlings, one next to the other, or at a spacing of 30-50 cm between plants; (end of June) manually, using hoe / pickaxe.
4. From the second year on the gaps between the plants are plugged by naturally expanding *Aloe vera* plants.

Maintenance / recurrent activities

1. Vegetative control: removal of *Aloe vera* plants that are invading cropland (maize, peas) between the life barriers.
2. Replanting of *Aloe vera* to fill gaps in life barriers (very rare; survival rate is over 95%).

Labour requirements

For establishment: medium
For maintenance: low

Knowledge requirements

For advisors: low
For land users: low

Photo 1: Well established *Aloe vera* life barriers on steep slopes. (Jacques Tavares)

Photo 2 and 3: Detailed view of *Aloe vera* life barriers; soil is accumulating on the upper side of the barriers. (Jacques Tavares)

Photo 4: *Aloe vera* life barriers are often combined with stone walls to enhance the erosion control on steep slopes. (Hans-peter Liniger)

Case study area: Santiago, Cape Verde



Establishment inputs and costs per ha

Inputs	Costs (US\$)
Labour: 65 person-days	215
Equipment: levels, hoes, shovels	13
Agricultural inputs: 5,000 plants	0
TOTAL	228
% of costs borne by land users	0%

Maintenance inputs and costs per ha per year

Inputs	Costs (US\$)
Labour: 1 person-day	3
Equipment	0
Agricultural inputs	0
TOTAL	3
% of costs borne by land users	100%

Remarks: Labour inputs for implementation are rewarded by project: Individuals of poor communities receive a salary of 3 US\$ per day. Plants are collected locally. Establishment costs do not include labour-intensive construction of stone risers (supportive measure). Maintenance costs are borne by land users.

Benefit-cost ratio

Inputs	short term	long term
Establishment	slightly negative	very positive
Maintenance	neutral / balanced	very positive

Remarks: Maintenance is not costly, it's simply vegetative control and punctual replanting.

Ecological conditions

- Climate: mainly semi-arid, partly subhumid
- Average annual rainfall: mainly 500-750 mm, >800 mm in wetter areas
- Soil parameters: mainly shallow loamy soils, with medium fertility and low-medium organic matter content; drainage is medium while water storage capacity is high to very high
- Slope: steep (30-60%), partly less
- Landform: mountain slopes and ridges
- Altitude: mainly 500-1,000 m a.s.l., partly 100-500 m a.s.l.

Socio-economic conditions

- Size of land per household: 1-2 ha (poor), 2-5 ha (better-off)
- Type of land user: small-scale, poor; partly medium-scale, better-off
- Population density: 100-200 persons/km²
- Land ownership: individual (titled) and communal (Diocese)
- Land use rights: mainly leased, partly individual or hereditary
- Level of mechanisation: mainly manual, few farms are mechanised
- Market orientation: mainly subsistence, few mixed (subsistence and commercial)

Production / economic benefits

- ++ Reduced risk of production failure
- + Increased crop yield
- + Increased fodder production
- + Increased production area

Ecological benefits

- +++ Improved harvesting / collection of surface runoff
- +++ Reduced surface runoff
- ++ Improved soil cover
- ++ Increased biomass / above ground carbon
- + Increased soil moisture
- + Increased water quality
- + Increased water quantity

Socio-cultural benefits

- +++ Improved conservation / erosion knowledge
- + Conflict mitigation
- + Improved food security / self-sufficiency
- + *Aloe vera* is used in traditional medicine / personal hygiene: pills against anaemia, diabetes and digestion problems; bactericide for wound treatment

Off-site benefits

- +++ Recharge groundwater table / aquifer

Weaknesses → and how to overcome

- Reduction of the production area, which is occupied by strips of *Aloe vera* → annual vegetative control within cultivated area and by cutting *Aloe vera* plants growing outside the life barriers.

Adoption

Most of the land users have implemented the technology by receiving financial incentives (payments). Totally 380 land users have adopted the technology; the area treated with *Aloe vera* life barriers is 71.5 km². There is a small trend towards spontaneous adoption.