The Status of Soils resources, Needs and Priorities for sustainable management in CAPE VERDE

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GLOBAL SOIL PARTNERSHIP

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CONTENT

I. Introduction

- Cape Verde is a small volcanic archipelago where a combination of human, climatic, geomorphologic and pedologic factors has led to extensive degradation of soils

- As a sahelian country, it has suffered the effects of desertification through the years, threatening the livelihood of the population and its fragile environment

- To survive in such fragile conditions, stabilization of farming systems and maintenance of sustainable yields have become absolute priorities in Cape Verde

I. Introduction

- Soil and water conservation strategies have been a centerpiece of the government´s agricultural policies for the last half century

- Combating desertification, drought effects and climate change are fundamental domains of the Environmental policy in CV

- However, despite the enormous effort in the implementation of SWC and reforestation, land degradation is still a reality, with an expressive need for aditional soil protection and conservation

II. Country general data

- Location: West African coast, 500 km from Senegal
- Surface area: 4033 km^2
- Composed of 10 islands and 5 islets
- Total population (2011): 501 000 (62% urban)
- Population density: 124 inhabitant/km2
- Contribution of agriculture to GDP: <12%

III. State of soil resources: soil characteristics

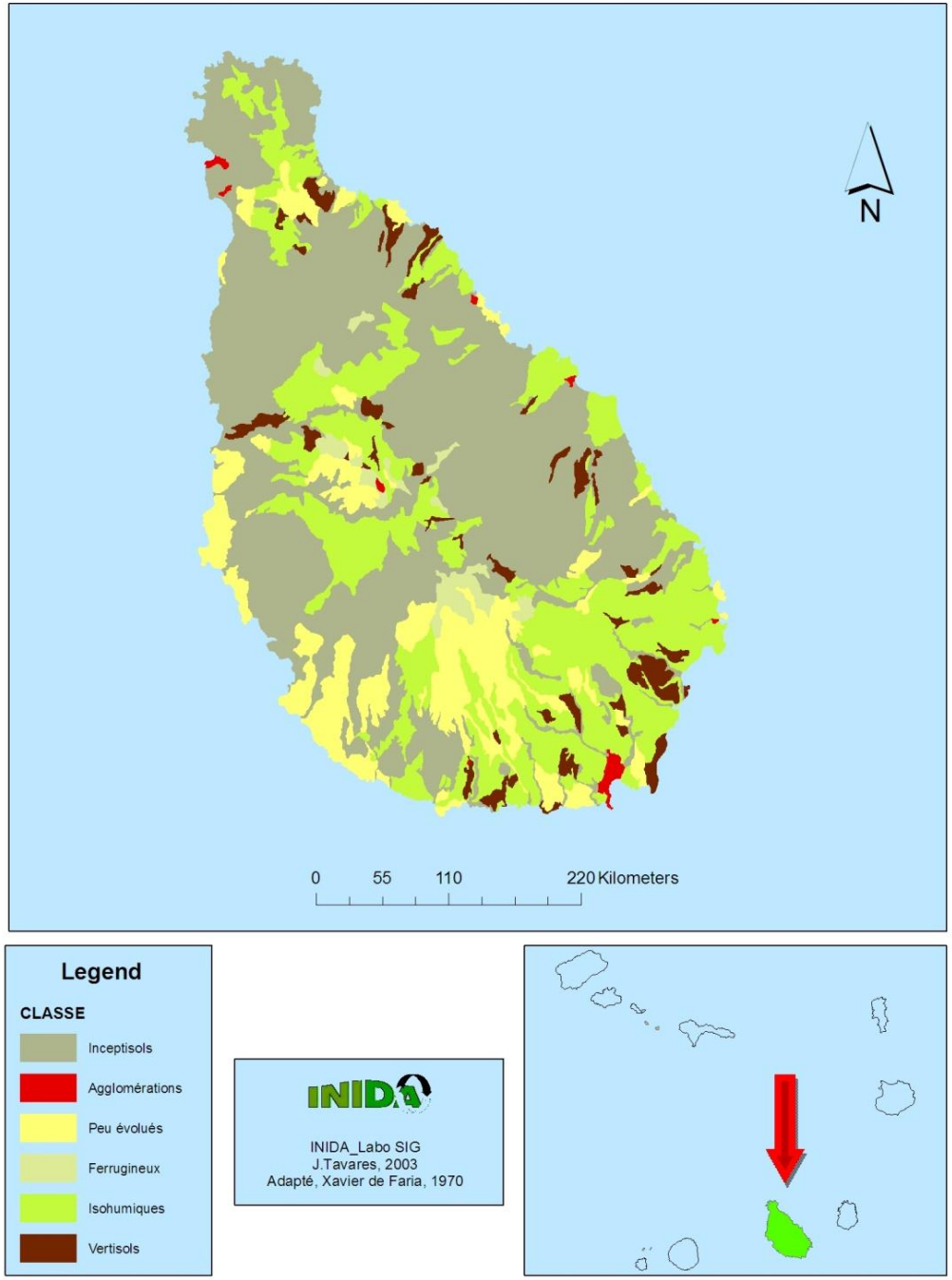
- The soils are mainly Inseptisols and entisols on basaltic substrate, are steep, low in OM, generally with low fertility, medium texture and exhibit marked symptoms of degradation (i.e. hills and gullies).

- Soils are mainly of volcanic origin, generally shallow with low water retention capacity.

- However, fertile and developed soils with differentiated horizons (mollisols) can be found on ancient surfaces.

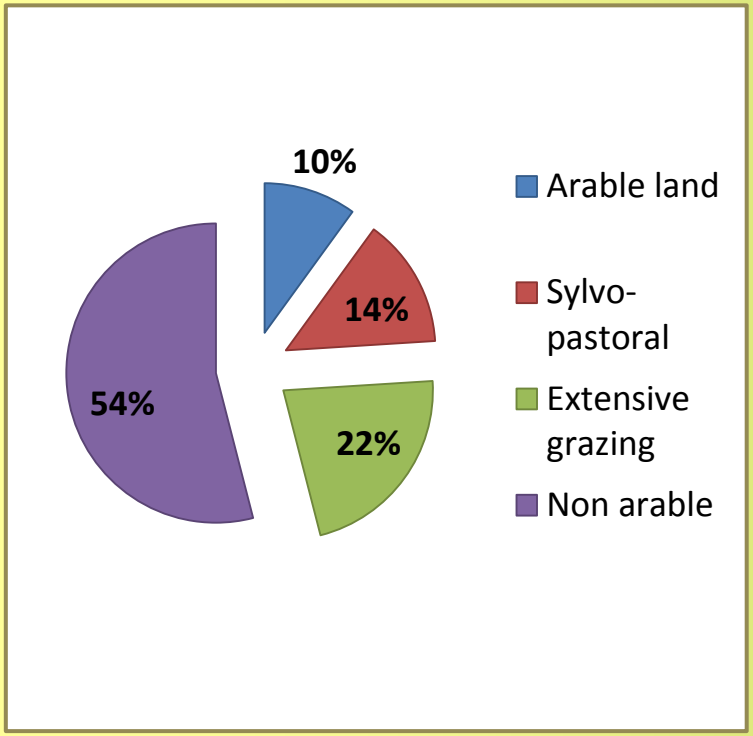
- Soils of alluviums and colluviums can be found the in valleys , constituting the major areas for irrigated agriculture.

Soil Map of Santiago (The largest agricultural island)



Land resources and their potential for use

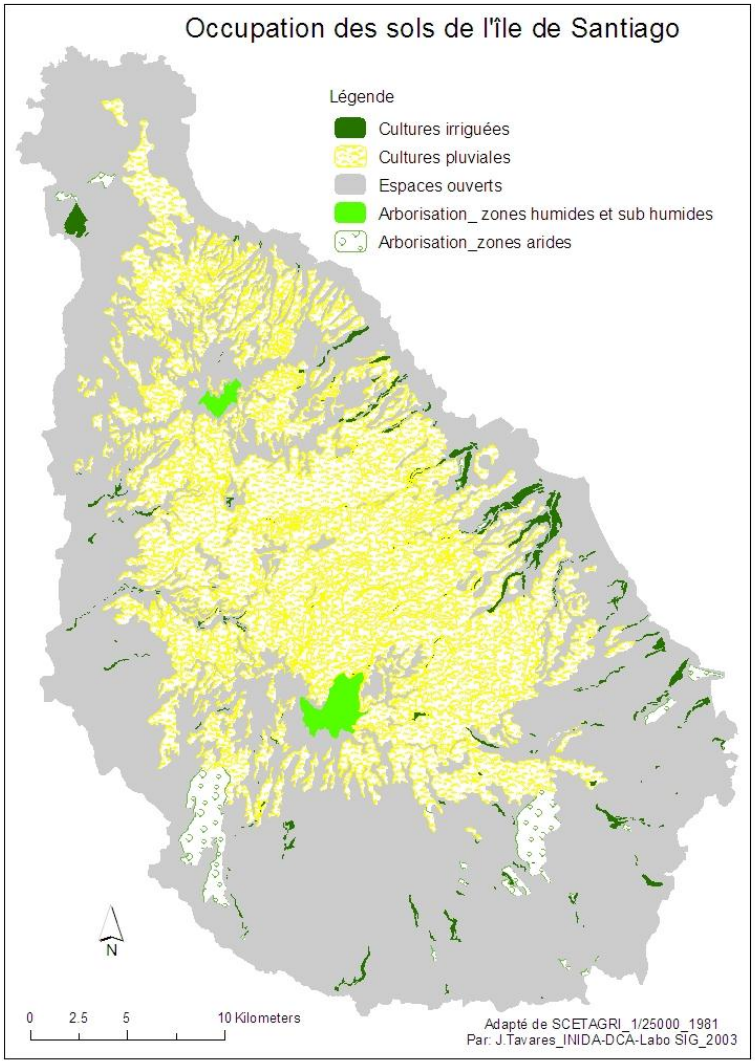
Soil potential for use



Land use (RGA, 2004)

- **Total arable land**: 41841 ha (10% of land surface)
- **Rainfed agriculture**: 32948 ha (80-90% of arable land)
- **Irrigated land**: 2732 ha (6,5%)
  - 800 ha with drip irrigation
- **Forest**: 82934 ha (22%

Land use for Santiago island



Agriculture systems

- **Rainfed /dryland agriculture:**
  - Totally dependent on rainfall regime
  - Practiced either in lowland areas or in relatively highland areas
  - Crops: especially maize (local varieties), beans and groundnut
  - Low input farming

- **Irrigated agriculture**
  - Practiced mainly in **alluvial deposits at valley bottoms** and in the **lower part of the hills slope**
  - **crop types**: sugarcane, fruits, vegetables, cassava and sweet potato

- Both systems are **mixed** with livestock production

Land degradation, erosion and desertification

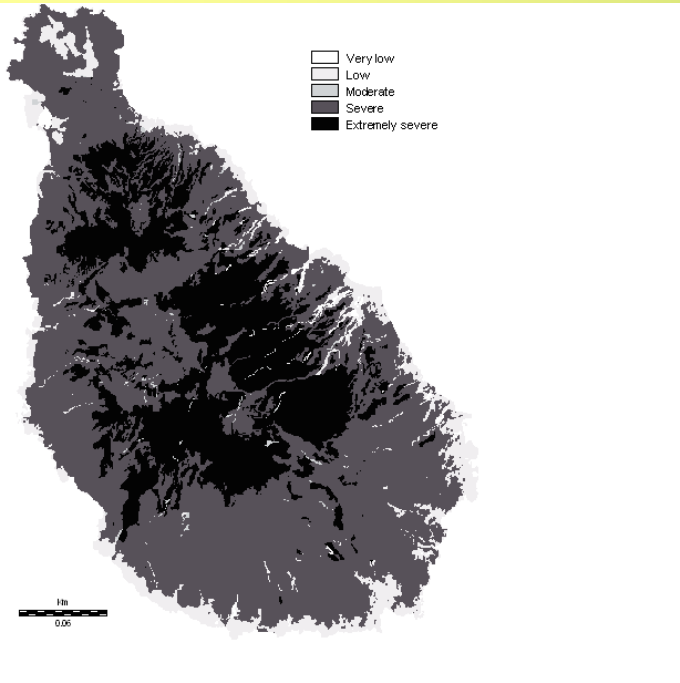
- Soil erosion and prolonged droughts are main drivers of land degradation and desertification in CV
- Values of soil erosion in the country show great spatial and temporal variability, depending on several factors (i.e. Land use, slope, rainfall amount and intensity, etc.)
- Some results:
  - 45 to 1097 ton/km2/yr in Ribeira seca (Smolowsky *et al*. 1998)
  - 0.2 to 60 t/km2/yr in Southern part of Santiago (Mannaerts,1993)
  - 2.3 ton/km2/yr at plot level in Godim (Santiago) (Querido, 1999)
  - 10 to 4266 t/km2/yr at sub-watershed level in Santiago (Tavares & Amiotte-Suchet, 2009)

Factors contributing to land degradation

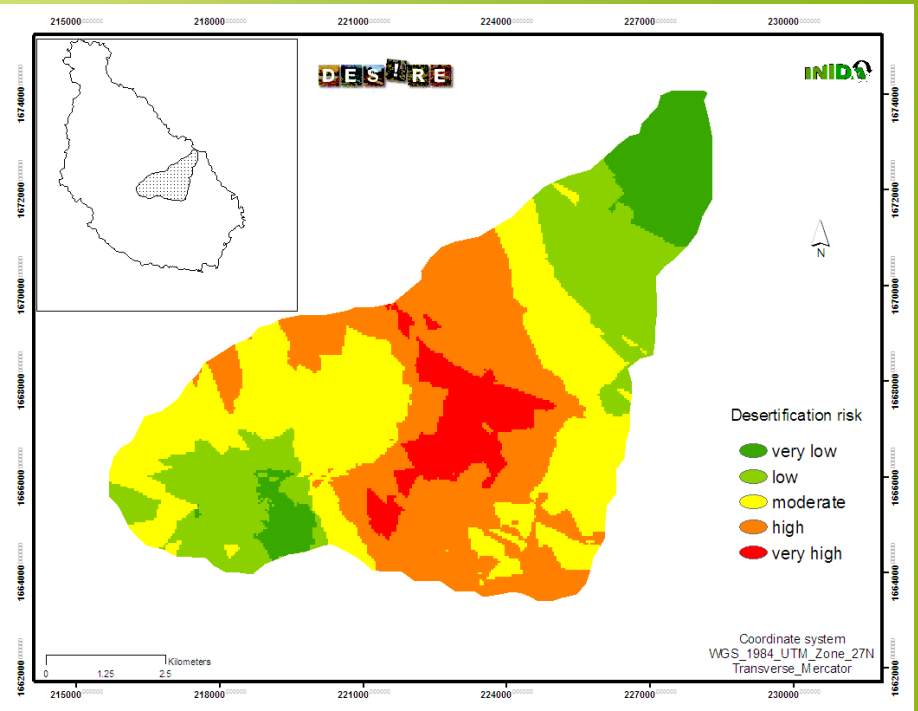
- ✓ Heavy rainfall events ⇒ Flash floods
- ✓ Low, insufficient and irregular rainfall (space and time)
- ✓ Frequent droughts
- ✓ Soil fertility decline (no nutrient replenishment)
- ✓ Low soil OM content (< 2%); bare soil
- ✓ Cultivation of very steep slopes
- ✓ Inadequate rain-fed farming practices
- ✓ Overexploitation of ground water ⇒ Water and soil salinization

Erosion + Land degradation ⇔ Desertification

Desertification risk



Erosion risk in Santiago Island (Tavares and Amiotte-Suchet, 2007)



Desertification risk map of Ribeira Seca Watershed (DESIRE, 2011)

- > 90% of Cape Verde soils exhibit moderate to very high risk of desertification, corresponding to rainfed agricultural land

- The trend is similar for all watersheds in the agricultural islands like Santiago

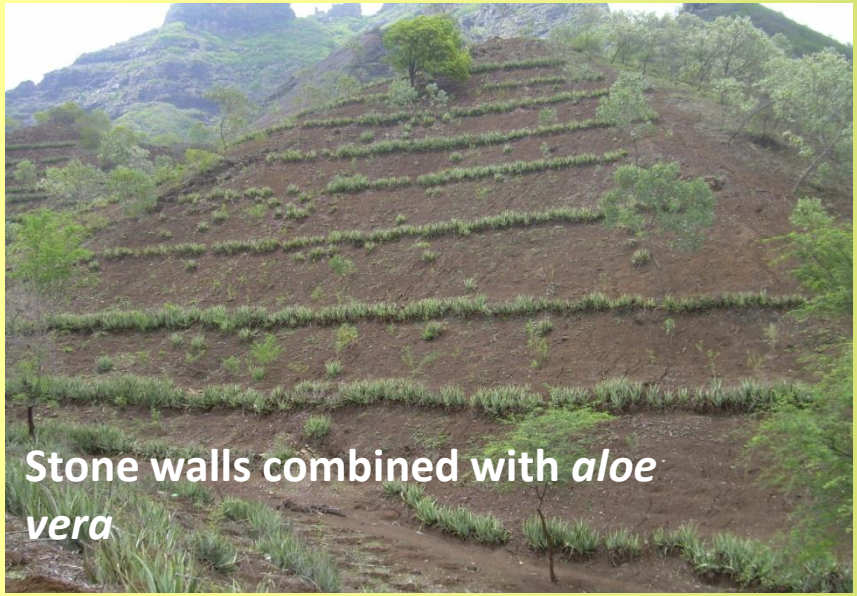
Current land management techniques and practices

- To deal with land degradation, CV successive governments have implemented several SWC techniques throughout the watersheds in the country
  - **in field**
    - Terraces, stone walls, contour ridges
    - Vegetation live barriers (green belts)
  - **off field**
    - water harvesting (large dams, reservoirs, etc)
    - Torrent control (check dams, etc.)

Soil and water conservation techniques


Contour ridges combined with *Leucaena leucocephala*


Contour stone wall combined w/ agroforestry species


Stone walls combined with *aloe vera*


Contour stone walls combined w/ *Furcraea gigantean*

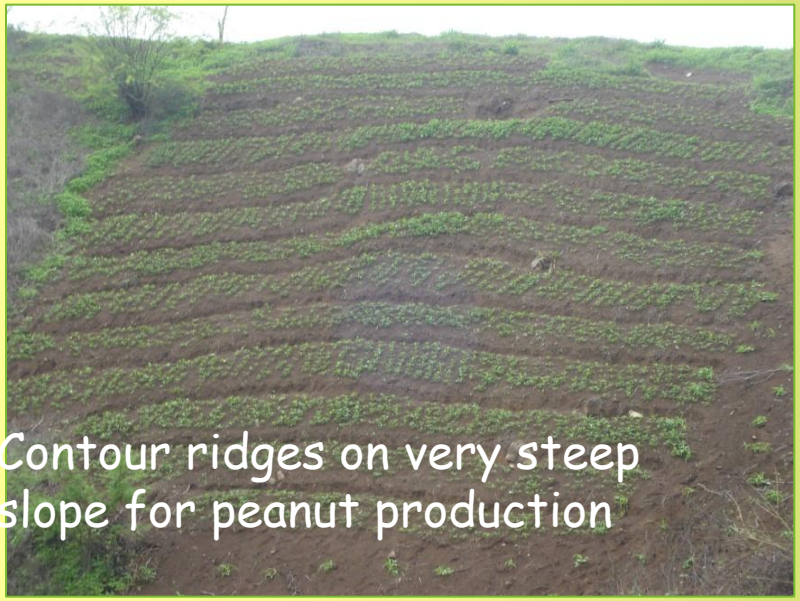
Soil and water conservation techniques

Contour furrow ridges for afforestation

Terraces for fruit trees and dry land crops(research station)

Terraces (farmers field)

Old terraces in Santo Antão



Contour ridges on very steep slope for peanut production

in-field (contour stone wall w/ vegetation barrier) and off-field (check dams) SWC techniques

contour stone wall

Aloe vera barriers

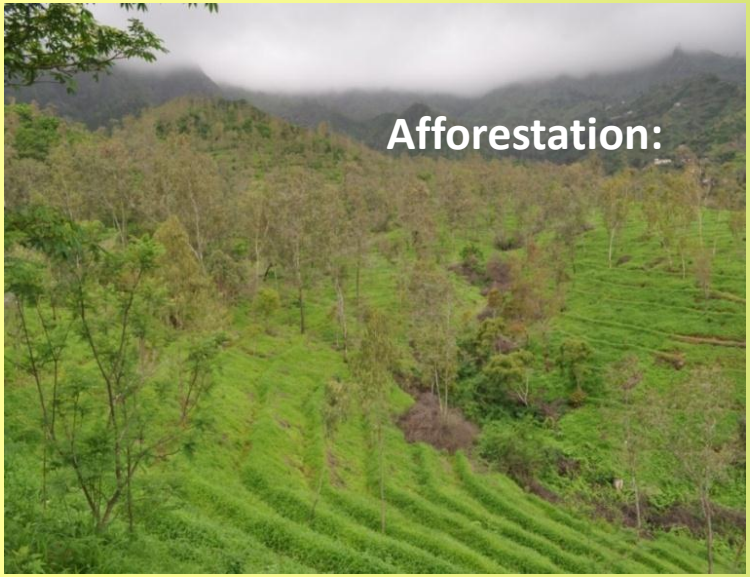
Off-field SWC techniques: Check dams

Masonry check dam

Gabion check dams

Stone check dams along waterways

Vegetation surface cover



Institutional settings for land management

- Sustainable land management is a crosscutting domain that requires joint effort and articulation among several institutions

- In CV, actions related to SLM are under the responsibility of the Ministry of Rural Development and the Ministry of Environment, Housing and Territorial Planning

IV. Constrains/Limitations in soil resources

- **High pressure on land resources** from poor agriculture practices, overgrazing, collection of fuel wood, increasing population, rural poverty, etc.

- **Urbanization**: use of good, fertile agricultural soils for urban development (construction and road building)

- **Exploitation of soil materials** (ex. rock, sand) for construction

- **Weak land tenure**: most land users are not owners ➔ low investment in good land management

- **Lack of specific legislation** on soil resource for agriculture purposes

V. Needs and priorities for sustainable land management

Short to medium term

1. Assessment, Monitoring & Mapping of Soil Resources

- ✓ Update and / or elaboration of soil maps as planning tools:
  - land vocation/potential
  - land use map
  - Soil classification
  - Agro-ecological maps in function of new climate and soils data
  - Soil quality and vulnerability to erosion risk
- ✓ In-depth studies on erosion quantification and processes
- ✓ Survey of vulnerable areas and need for soil protection and conservation per watershed

V. Needs and priorities for SLM

Short to medium term

2. Introduction of sustainable land management practices that promote soil cover and moisture retention:
   - conservation agriculture system

3. Enforcement and maintenance of Soil and water conservation techniques, including afforestation and vegetation barriers, in dryland

4. Promotion of stakeholders effective participation
   - Sensibilization of farmers regarding the dangerous of land degradation and need for SLM
   - Accountability of civil society, NGO's and rural communities in sustainable management of soil resources
   - Financial incentives for SLM practices

V. Needs and priorities for SLM

Long term

1. Preparation, implementation and follow-up of soil legislation adapted to agricultural use

2. Increase capacity building of research in the domain of land degradation and SLM through:
   - training of researchers
   - Laboratory equipment
   - Research of best SLM practices adapted to the country
   - Technology transfer
   - Financial resource

VI. Final remarks

- ✓ It is undeniable the positive impact of SWC on environment and on combating land degradation and desertification in the country

- ✓ Nevertheless, it is necessary to strengthen actions in areas where the risk of desertification is high

- ✓ With limited land resources in Cape Verde, it is crucial to implement sustainable land management practices as key to a more sustainable agriculture

Big Question

- How to stop **degradation from agricultural lands**, **maintain and / or restore natural soil fertility**, not ignoring **poverty of smallholder farmers** and, at the same time, **assuring agriculture and environmental sustainability**????


Thank you for your attention!
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