

SWIM and Horizon 2020 Support Mechanism

Working for a Sustainable Mediterranean, Caring for our Future

SWIM-H2020 SM Regional Activities

Training on Cost of Environmental Degradation

Presented by:

Mr. Gert Soer, water management expert

Land degradation in Morocco

12 July 2018, Ramallah, Palestine

This Project is funded by the European Union



umweltbundesamt[®]

ATKINS

Content of the presentation

- **Background**
- **Methodology**
- **Valuation steps**
- **Share of degraded crop land**
- **Decrease in yield and cost of degraded crop land**
- **Share of degraded range land**
- **Cost of degraded range land**

Background

- In Morocco, 93 percent of the land is arid, and 7 percent is sub-humid and humid (FAO 2004). Soils have low organic matter content (<2%) and are thus fragile (wind and water erosion). Overexploitation hence easily leads to soil degradation
- Economically, agriculture is important in Morocco. It generates 15% of GDP and employs 40% of Morocco's workforce (2017 data).
- Arable land and permanent crops represent 9.9 million hectares, irrigated agriculture covers about 1.4 million hectares (and consumes 82 percent of the available water resources).
- Rangelands occupied about 60 million hectares.
- Morocco produces most of its food needs, except for wheat.
- Demographic growth has contributed to an increased demand for agricultural and livestock products, pushing farmers to overexploit the rangeland resources and to convert productive rangelands to marginal croplands.

Methodology

- Estimating the magnitude of land degradation and its consequences is difficult.
- In theory, assessing on-site effects is straightforward - for example, by using the production function approach.
- In practice, however, the assessment is empirically difficult because of the lack of appropriate data about the yield impact of degradation.
- Moreover, the site specificity of soil characteristics limits the applicability of data collected in one location to the analysis of problems at another.
- Amalysis has been made with data of the year 2000.

Valuation steps

1. Estimating the share of degraded land in total cropping area
2. Estimating the impact of land degradation on crop productivity
3. Assessing the cost of degraded cropland

Share of degraded land in total cropping area - 1

Four degrees of land degradation are distinguished in terms of reduction in land productivity:

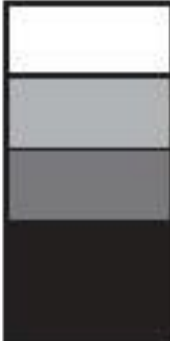
- **Light**, expressed through a low reduction in productivity
- **Moderate**, expressed through a considerable reduction in productivity
- **Strong**, when biological functions of soil are considerably destroyed and there is no potential for rehabilitation and use
- **Extreme**, when biological functions of soil are considerably destroyed and lands cannot recover

Share of degraded land in total cropping area - 2

In addition, the spatial extent of land degradation reflects the share of degraded land in one geographical area (mapping unit). This share is classified within the following five ranges: 0–5 %, 5–10 %, 10–25 %, 25–50 %, and 50–100 %.

Figure 5.1 Classes of Land Degradation Severity

degree of degradation	spatial extent of degradation (% of mapping unit affected)				
	0–5	5–10	10–25	25–50	50–100
light					
moderate					
strong					
extreme					



light
moderate
severe
very severe

Source: FAO 2000.

Decrease in yield and cost of degraded crop land

Most of the not irrigated arable land is used for wheat. Reduction related to soil degradation was never investigated in Morocco, so data are used from India: light degradation corresponds to a 5 % decrease in cereal yield; moderate degradation, to a 20 % decrease; and strong degradation, to a 75 % decrease.

Table 5.2 Estimated Cost of Degraded Cropland

	<i>Light degradation</i>		<i>Moderate degradation</i>	
	<i>Lower bound</i>	<i>Upper bound</i>	<i>Lower bound</i>	<i>Upper bound</i>
Extent of degradation (% of land area)	50	100	25	50
Degraded agricultural land (ha thousands)	4,350	8,700	2,175	4,350
Level of decrease (% drop in yield)	5	5	20	20
Decrease in yield (qx/ha)	0.5	0.5	2.0	2.0
Lost production (qx thousands)	2,175	4,350	4,350	8,700
Lost value (US\$ millions)	52	104	104	209
Average loss (US\$ millions)	78		157	

Share and cost of degraded range land

Pressure of climate change, overgrazing and (other) human interference

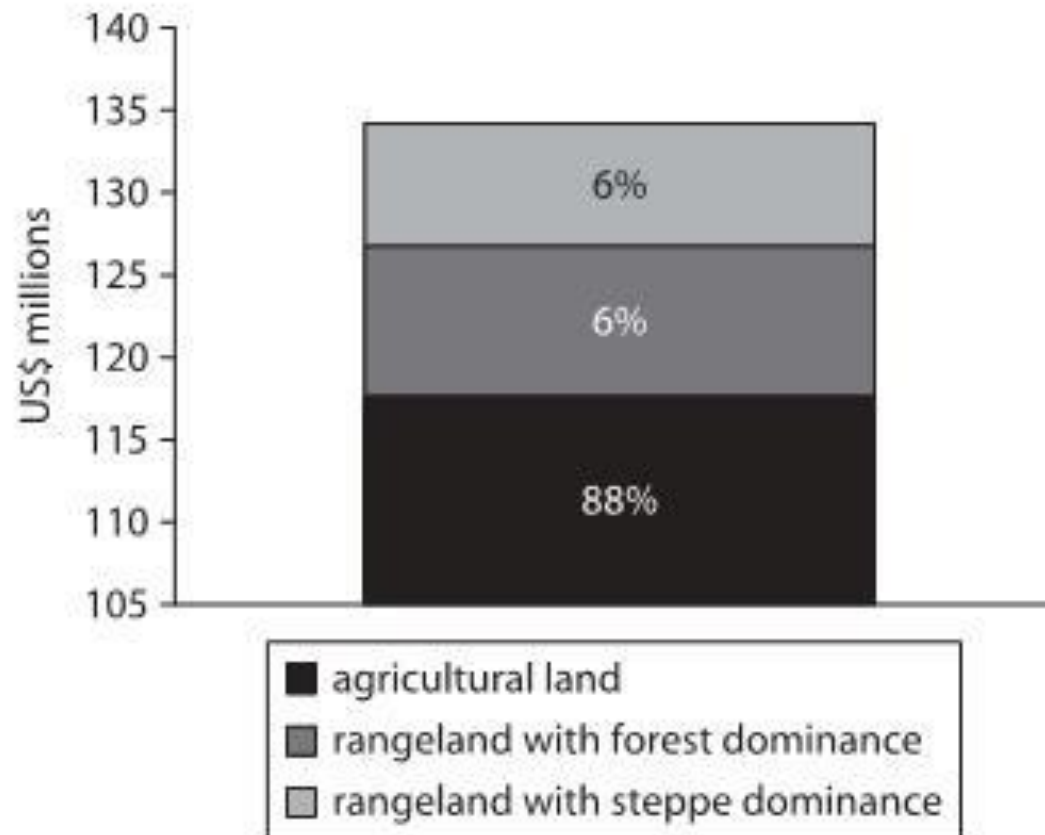
Table 5.4 Estimated Loss of Forage Production and Damage Costs to Rangelands

	<i>Lower bound of productivity loss (6%)</i>		<i>Upper bound of productivity loss (10%)</i>	
	<i>Rangelands with steppe dominance</i>	<i>Rangelands with forest dominance</i>	<i>Rangelands with steppe dominance</i>	<i>Rangelands with forest dominance</i>
Rangeland (ha thousands)	12,000	5,100	12,000	5,100
Degraded area (% of rangeland area)	46	19	46	19
Forage productivity (FU/ha/year)	79	558	79	558
Yield loss due to degradation (%)	6	6	10	10
Total loss due to degradation (FU thousands)	26,170	32,440	43,600	54,070
Cost of forage (US\$/FU)	0.2	0.2	0.2	0.2
Damage cost due to degradation (US\$ millions)	5.6	6.9	9.3	11.5
Average damage cost per scenario (US\$ millions)	12.5		20.9	
Average damage cost (US\$ millions)	16.7			



Cost of land degradation calculated in the year 2000

Figure 5.2 Annual Cost of Cropland and Rangeland Degradation, by Category



Total costs for land degradation in Morocco

Tableau 5.13. Coût total de la dégradation des sols en 2014

	Borne inférieure (Millions DH)	Borne supérieure (Millions DH)	Valeur moyenne (Millions DH)	% PIB
<i>Terres agricoles</i>				
Dégradation des terres de culture pluviale	1 071	1 071	1 071	0,12%
Salinisation des terres irriguées	259	930	595	0,06%
<i>Sous-total (terres agricoles)</i>	<i>1 330</i>	<i>2 001</i>	<i>1 666</i>	<i>0,18%</i>
<i>Terres de parcours</i>				
Défrichement, désertification	2 696	2 696	2 696	0,29%
Dégradation	618	618	618	0,07%
<i>Sous-total (terres de parcours)</i>	<i>3 314</i>	<i>3 314</i>	<i>3 314</i>	<i>0,36%</i>
Coût total	4 644	5 315	4 980	0,54%

10 Dirham = 1 USD

SWIM and Horizon 2020 Support Mechanism

Working for a Sustainable Mediterranean, Caring for our Future

Thank you for your attention.

This Project is funded by the European Union

