Land Degradation Types in Jordan

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Introduction

-Within its area of 89300 km², Jordan encompasses a wide range of physical parameters.

-Altitude ranges from (-392m) at the surface of the Dead Sea to the (1754m) of Jebal Ram.

-Climate varies from sub humid Mediterranean in the north-west of the country with rainfall of about (500mm) to desert conditions with less than (50mm) over a distance of only 100km.

-The population is approximately 10.4 million (2017), with a 2.4% annual growth rate.

-Currently around 78% of the populations live in the northwest quadrant of the country. (Amman, Irbid, Zarqa and Balqa).

TOPOGRAPHY

-The uplifting from south to north and tilting to the east of the Wadi Arabah - Jordan Valley graben has produced high altitudes in the south-west of the country, with gradients running to the north and east over most of the country.

-To the east, the gradient is gentler with a drop of a bout 850m over 225km to the Saudi border.

-In the north the land slopes from a maximum altitude of 1234m on the Syrian border to 500m at Azraq over a distance of 55km.

Slope %

Gradient	Area Km^2	%
0-5	56000	60
6-15	8500	10
>16	27800	30
Total	89300	100

SOIL

-Six order have been recognized all over the country.

Aridisols
Inceptisol
Entisols

Widespread occurrence in the country within the Aridic Moisture Regime, which represent approx. 80% of the total area.

Vertisols
Molisols

Mainly in High Lands

-Occur in Irbid,Madaba, Karak & Tafilah
-Occur under natural forest, dense shrubs mainly Ajloun Area

Andisols

Avery limited area associated with parent materials of volcanic cones in the badia zone

(National Soil Map and Land Use project, 1995, Ministry of Agriculture/ JORDAN).

MAIN CHEMICAL CHARACTERISTICS

Calcium Carbonate

-Majority of soils is calcareous
-Sources are Aeolian dust
-Calcic- horizons occur in the dry steppe

Clay Content

-Moderate to high clay content and decrease from north to south, and from west to east.(highest in an alluvial
-Soil derived from basalt in the arid north east Jordan, 67% clay.
-PH varies 7.2 - 8.4

Organic Matter

-Low content and wide C/N ratio.
- 1.13% - 1.71% in highland rainfed.
- 1.47% in J.V irrigated.

Soluble Salts

-Generally Increase with decreasing rainfall
-Badia contains large amount of soluble salts and less amount in wadis.
-Ece exceed 30mS/cm in Camborthid & Calciorthid.
- 92 mS/cm in Typic gypsiorthids.

Main Soil Chemical Charactareristic

Agro-ecological Systems	CaCo3% 26-60 cm	Clay% 26-60 cm	O.M% 0-10 cm	EceMS/cm 20-60 cm	Gypsum Content % 20-60 cm
Jordan Rift Valley	18	24	**1.47**	2.5-5.8	5.0
Highland	13	**51**	1.13	2.6	-
Steppe Zone	**37**	33	1.21	25.3	-
Badia	25	23	0.37	**60.1**	**15.2**

Agro-ecological Systems

1- Jordan Rift Valley: **- The main irrigable cultivated land**
- 29.6 thousand ha north Dead Sea.
- 6.4 thousand ha in south Dead Sea.

Jordan Rift Valley divided to:

*** North Dead Sea:** ***which is naturally falls into three units***

-Zor: **- The present flood plain of Jordan river.**
- Bad drainage in some areas.
- Land use mainly vegetables.
- Thick mixture &weak development.
- *Ustic Torriorthents & Typic Ustochrepts*

- Lisan(*Katar*): **- Severely eroded badlands a long the margins to the zor.**
- High salinity & Very low permeability.

- Ghor **- Occur as Sedimentation over katar & slopes toward zor.**
- Highly productive lands, mainly (veget., Fruits & wheat).
- Ustochreptic Camborthids & Calcorthids

***South Dead Sea:** **-Include Ghor Safi to Gulf of Aqaba.**
-Lies within the hot desert zone (80mm).
-Contains moderate to high levels of soluble salts.

Dominant soils types:

-Torriorthents, Saliorthids, Torripsamment,Camborthids & Torrifluvents.
- The irrigated land mainly in *Camborthids and Torrifluvents.*

Current & Future Trends:

-Ghor has some pollution by waste water, insecticides and plastic.

-Salinization, Soil quality deterioration and lack of fertility are emerging in many areas.

-Water consumption for potable, domestic and industrial purposes decrese irrigated water, and so increase mixed water.

2- Highlands:

Soil:

- **Developed on limestone or limestone associated with Basalt's**
- **Contains a wide range of soil type reflecting a wide range of physical characteristics.**
- **Major great groups are:**

Xerochrepts, Calcixerollic Xerochreps, and Vertic Xerochreps. (deep soils found in areas with a slope of less than 12% that is the main soils used to cultivate field crops).

Vertisols (Chromoxererts) occupy areas with slope less than 5%. Lithic Xerorthents and Lithic Xerochreps occupy an areas with slopes more than 12% and suffer from continuous erosion due to medium texture and shallow soils.

Current & Future Trends:

- Affected by desertification factors- mainly the recession of plant cover and increasing erosion of agriculture soil.

-Water consumption for potable, domestic and industrial purposes will increase at the expense of irrigated areas in the highlands, which depend on groundwater.

-Natural forests are deterioration.

-Danger of fires and trespassing in forests.

3- Marginal land (Steppe):

- About 1 million hectares.
-Major and traditional Grazing for livestock.
-Suffers from Desertification and loss of plant cover.
-(15) grazing reserves have been established, with almost 18 thousand hectares

Soil:

-Derived from limestone associated with Basalt's rocks.
-High in Silt and Calcium Carbonate contents.
-Salinization and Gypsum increase towards east.
-Low level of O.M. and the formation of the surface Crust cause high rates of erosion.
-Major soil group:
- Xerochreptc Calciorthids, Camborthids
-Xerochrepts and Xerorthents
–Calciorthids and Camborthids
-Lithic Torriorthents and Lithic Xerorthents

Current & Future Trends:

-Increased effect of desertification due to severe erosion by wind and water in addition to the poor-quality soils.

-Irrigated land will decrease, due to the depletion of the groundwater and wells.

4-Badia - Desert :

- Around 7 million-hectare.
- Annual rainfall is 100mm North, 50mm South.

Soil :

-Developed from Basalt's, which dominant in northeastern areas. Characterized by High percentages of salts and lime.

-Soil of southern area developed from sandstone and granite. Characterized by weak texture , and contain variable rate of salt and Gypsum.

- Major soil types:
  - -Calciorthids and Camborthids
  - -Cambic Gypsiorthids
  - -Lithic Torriorthents
  - -Xerochrepic Paleorthids

Current & Future Trends:

-Desertification is progressing due to the prevailing dry climate.

- Salinization and recession of plant cover are the major problems.

-Water demand for potable and domestic purposes will most likely exceed that for irrigated areas reliant on groundwater.

Land Degradation Types

•Vegetation Cover Deterioration:

Major causes of vegetation cover deterioration:

1-Early Overgrazing

-Increasing number of animals lead to vegetation cover deterioration in Jordan.

-Total number of animals (sheep & goats) has been increased In the last 5 decades

-Disappearance of most of the palatable plant species and the number of wild animals (make deterioration in the ecosystem and biodiversity).

2-Firing

- 20-100 fire/year destroy 20-30 thousands tree/year.

3-Overexploitation:

-A growing population puts greater demands on the land.

-The IRBID GOVERNARATE, the second in population in the kingdom, lost more than 30.000 ha of it's agricultural land in the past decades to the greater Irbid Expansion.

4-Legal and illegal cutting:

- Contribute in destroying 10-20 thousand trees yearly.

•Soil Erosion

-Quantity and the intensity of rain, beside the topography (degree and length of slope) play an important rule in erosion.
-20% of the total amount of rain in the high lands goes as surface runoff.

-The removal of soil particles by the action of water

(Decline in land quality due to sediments deposition by water erosion).

- *The topography (the degree and the length of slope).*

(Out crop rock due to water erosion).

- *Removal of soil particles by* ***wind action***

(Suspended dust is deposited on agriculture land)

-Plowing of 120 thousands ha/year of the marginal area in badia to plant Barley reduced the Physical and Biological Properties.

(Vegetation cover & Land productivity of the marginal area decline due to misuse of land)

•Salinization:

-Worldwide problem, particularly acute in semi arid areas that use lots of irrigation water. *e.g.* (3,000-6,000 ppm salt results in trouble for most cultivated plants in J.V.)

-Occurs in conjunction with poor irrigation management that causes accumulation of salts in the root zone.

-While the marginal area the drought conditions increase the water evaporation through the soil profile.

•Defragmentation Ownership

- Growing population puts greater demands on the land.

-Lacks of legislation

-Complex social structure.

-The redistributed ownership of the irrigated land to land units of 3 –4 ha at least and not more than 20 ha/owner in Jordan Valley.

-The Tribal Social Structure is the main obstacle for improving the lands in Badia area .

•Mining

-Phosphate mining south of Jordan. *e.g.* (400-600 traffic/day in addition to train is transporting phosphate to Gulf of Aqaba for exporting).

-Cement mining in the highland (Air Pollution in Highly populated area).

-Quarries are distributed which are essential for the construction process in highland.

- Excavating the building stones for houses in Ajloun (the main natural forest area in the country).

•Overexploitation

-Increasing numbers of people require more food, more water and more construction materials.

-requirement for more extensive infrastructure.

-IRBID GOVERNARATE, the second in population in the kingdom, lost more than 30.000 ha of it's agricultural land in the past decades to the greater Irbid Expansion.

•Pesticides and Chemical Fertilizers

-Huge amounts of pesticides and fertilizers.

-Using 20 tons of DDT in 1976 and decreases to 1.3 ton in 1988.

-Destroying the ecosystem by increasing pollution.

Thanks For Attention