



NENA Soil Partnership Conference: towards a regional implementation plan on sustainable management of soil resources

1-3 June 2015, Amman, Jordan

Status of Soil Resources and Priorities towards Sustainable Soil Management

Challenges, Opportunities, National Policies and Institutional Mechanisms

Country: Jordan

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Country Profile

- **Area : 89300.**
- **Population approximately 6.460 million**
- **Rate of growth: 2.8% per year.**
- **Economic Sectors: Agriculture 2.8%, Industry 17%, Services 74%.**

3-Population

The population of Jordan is about 6,460,000 and the annual growth rate is 2.8% according to age categories, the population is distributed as following:

Below 15	50%
15 – 59	46%
Above 59	4%

Climate varies from Sub humid Mediterranean in the north-west with rainfall of about 600mm to desert conditions with less than 50mm.

Land use in Jordan

Utilization pattern	Area km ²	% of total area
Range lands	80700	91.4
Building & Public Utilities	1700	1.9
Forestry	700	0.8
Land registered as Afforested	600	0.7
Agricultural lands	5100	5.7
Water surface	500	0.5
Total	89300	100.0

Agro-ecological Systems:

Jordan is divided into **FOUR Agro-ecological Systems**.

- **Jordan Rift Valley** Which occupies the depression that extends from lake Tiberias in the north (212m below sea level) to the Dead Sea (392 m below sea level) and to Gulf of Aqaba in the south.
- **Highlands**, a narrow distinctive, that lie almost parallel to the Jordan Rift Valley.
- **Marginal Lands (steppe)** located to the east of the Highlands, border Syria on the north, Azraq and Wadi Sirhan Basin on the east, Ras El -Naqab on the south.
- **Badia Zone (Desert)** which is located to the eastside of the steppe, extend eastward to the Saudi Arabian and Iraqi borders.

LAND RESOURCES

- Out of the total area of Jordan, only (400) thousand ha are cultivated, 61% lie within municipal and village boundaries.
- 322 thousand ha rainfed agriculture land and 78 thousand ha irrigated agriculture land. 36 thousand ha in JV and 42 thousand ha in high land).
- Range land (<200mm) constitute about 91% of the land.
- Approximately (41) thousand ha of natural forests and (35) thousand ha of forest plantations, (Total 76000 ha).

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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 Camborthids & Calciorthids.
- 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, plastic & hormones.**
- Salinization, Soil quality deterioration and lack of fertility are emerging in many areas.**
- Water Consumption for potable, domestic and industrial purposes decrease irrigated water, and so increase mixed water.**
- More dams will be established.**

2- Highlands: - Narrow distinctive area, lie almost parallel to the Rift valley.

- Cultivated with field crops, vegetables and fruit trees

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:

Typic Xerochrepts, Calcixerollic Xerochrepts, and Vertic Xerochrepts.
(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 Xerochrepts** 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:
 - Xerochreptic 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.**

•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 Land and 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.

1345 ha in Jordan Valley have been degraded due to the misuse of irrigation practices.



(Due to Salinization, the world loses at least 1.6 million hectares of fertile arable land every year)

•Defragmentation Ownership

- Growing population puts greater demands on the land.**
- Lacks of legislation**
- Complex social structure.**
- Increasing the numbers of parcels leads to decreasing the size due to exploitation in the high lands.**
- 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.

-Destroying the ecosystem by increasing pollution.

Major challenges of soil resources

- 1. continuation of soil map and land use project.**
- 2. Conservation of Biodiversity**
- 3. Establishment and developing of the data bank-GIS based on up-to-date information systems.**
- 4.To protect the soil from soil salinity, soil erosion, soil pollution and soil sealing**
- 5. Capacity bulding in soil mapping , legacy data and soil management .**

The Ministry of Agriculture Lead the Conservation of LR

Other Local Agencies

involved in Agriculture Land recourses and environment studies, research and experiments.

1. The National Center for Agricultural Research and Technology Transfer,
2. Universities of Jordan,
3. The Higher Council for Science and Technology,
4. The Jordan Badia Research and Development Programme,
5. Other numerous projects being implemented by the Ministry of Agriculture with some international agencies.

Role of the Projects in Combating Land Degradation.

1-Rangelands Improving Project/ Ministry of Agriculture:

-Supervised by Forestry and Range Directorate.

-27 range reservations have been established till now with total area of 75000 ha.

2-High Land Project/ MoA:

-Many project in cooperation with the world food program.

-Establishing soil conservatives measures like stone walls, terraces etc.

3- Zarqa River Basin Project/MoA:

- Covers 82.5 thousand ha of the private owned agriculture lands.**
- Proper extension, implementing the proper conservative measures and planting the proper plants.**
- Improving the range and forest lands and protecting the Zarqa River sides.**

4-Hammad Project/MoA:

- Improve the rangelands for a good livestock production and improving the water sources.**
- Improve their social and economical situations in the nouterneast of the kingdom.**
- Implementing many dams and digging big holes in the area to collect water and two artesian wells.**

5-Afforestation and Forest Management projects/MoA:

- Managing and protecting the natural forests.**
- Increasing the artificial forests through a yearly plan.**
- Involving the private sector in improving lands (Participation).**

6 -Combating Desertification Project in Azraq:

- In 1994 to study the optimum use of available soil and water resources in Azraq Oasis in an integrated sustainable way and rehabilitation of the area.**

7-National Soil Map and Land Use Project:

-Started in 1989, and the main objectives are to identify, describe and geographically locate areas of arable lands and obtain all information about soils necessary for agricultural and urban project planning to classify arable land areas according to suitability for irrigated and non-irrigated agriculture.

Thank You

