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Iranian Soil Resource, Extent of Soil Salinity and Strategies for Saline Soil Management

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Introduction

The Islamic Republic of Iran is located in West Asia. Total area at this country is 1.648 million km² (Land: 1.636 million km² and Water: 0.012 million km²). About 90 percent of Iran is arid and semi-arid with summer temperatures in the interior reaching as high as 55C◦. Less than 2% of Agricultural land in Iran is very good and up to 60% is poor and medium for cropping. Estimates suggest that about 34 million ha, including 4.1 million ha of the irrigated land, are salt-affected in Iran as the consequence of Naturally occurring phenomena (causing primary or fossil salinity and/or sodicity) Anthropogenic activities (causing secondary salinity and/or sodicity) FAO, 2000.

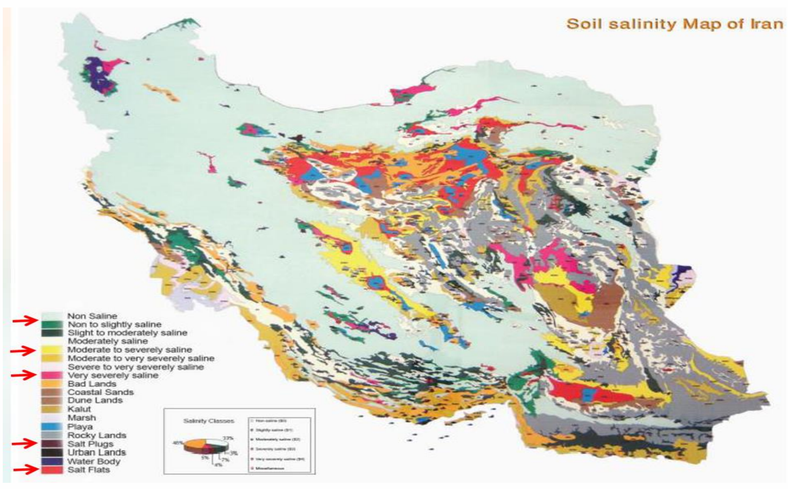


Figure 1: Soil Map of Iran indicating area under salt-affected soils and other types of landscape

Methodology

1- Assessment and Monitoring Programmes

a. Establishing networks for the monitoring of spatial and temporal changes in soil salinity.
b. Developing water quality monitoring programmes

2. Salt Leaching and Drainage Interventions (Experience in Iran)

3. Crops and Crop-assisted Management Approaches

4. Chemical Amendment and Fertilizer Use

The use of balanced fertilization is crucial in various crop production systems on salt-affected soils as these soils are characterized by low levels of organic matter and nitrogen. Alternatively, green manuring of such soils can be used to improve soil structure and enhance nitrogen content.

The increase in nutrient demand by the prosperous society and the decreasing availability of arable land and freshwater lead to the problem of agriculture sustainable development.

Table 1:Changes in Per Capita of Agricultural Lands in Iran Over Time

Year	Population (million people)	Cultivated Area (million ha)	Per Capita Land (ha)
1993	57	15.5	0.27
2003	68	17.7	0.26
2014	79	16.4	0.21

In a field study, Ardakani and Zahirnia (2006) evaluated the effects of gypsum application on erosion and runoff in unstable sodic soils south of Tehran. (Experience in Iran).
The application of gypsum also had a significant effect on soil salinity. However, there were non-significant differences among different forms of gypsum applied to the soil.
Studies have been carried out on the amelioration of sodic and saline-sodic soils by acidification through the application of sulphuric acid and sulphur powder enriched by

Table **2:Iran** Agriculture

Physical Area	Area (million ha)	Percentage	Production (million tons)
Area of the country	164.8	100	—
Cultivated area	14.7	8.9	104

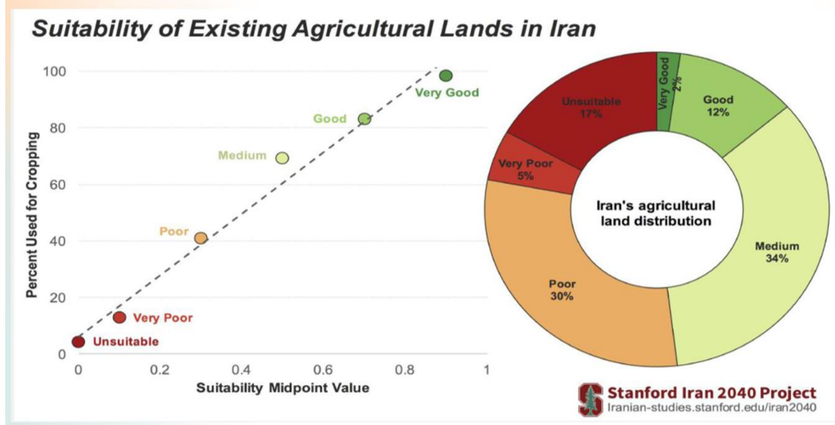
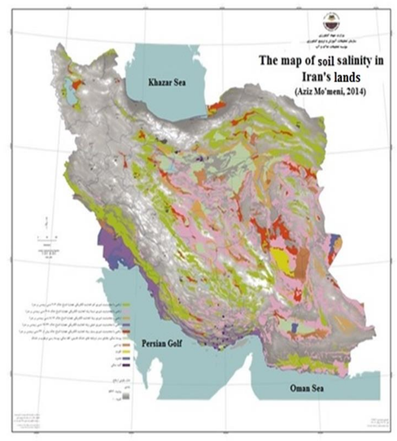


Figure 2: suitability of existing agricultural lands in iran

Source of salt in Iran soil A: Natural
Geological composition of the parent material of the soils.
Stream salinity causing salinization of surface water resources, mainly due to natural conditions.
Wind-borne salinity resulting from strong winds, blowing most part of the year in the Central Plateau.
Seawater intrusion, which occurs mostly in coastal areas where seawater enters the inland channels or inundates coastal lowlands by tidal waves.
Low rainfall and high potential evapotranspiration as a consequence of extreme temperatures. Source of salt in Iran soil B: Anthropogenic
Irrigation with saline and/or sodic waters without adequate management practices in areas of extreme water scarcity.



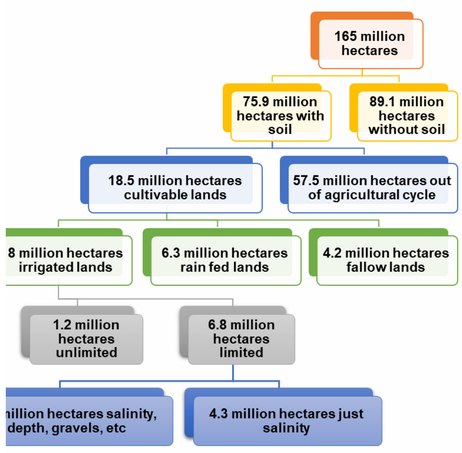


Figure 3: The map of soil salinity in Iran

Lack of drainage facilities, which are the key to appropriate disposal and reuse of saline drainage water generated by irrigated agriculture.
Unsustainable pumping of groundwater through over-exploitation of saline aquifers.
Inadequate irrigation management practices with freshwater such as over-irrigation, particularly in areas with no or limited drainage, resulting in rising water tables and waterlogging problems.
Over-grazing of the pastures and other vegetation resulting in exposure of soils to greater risks of salinization

Conclusions

Strategies for Salinity Management:
Assessment and Monitoring Programmes (There is a need to use modern approaches such as Geographical Information Systems (GIS) and Remote Sensing (RS))
Salt Leaching and Drainage Interventions (Experience in Iran)
Crops and Crop-assisted Management Approaches (Potential Alternative Crops for Cropping Systems (Experience in Iran) (Maleki et al., 2022))
Chemical Amendment and Fertilizer Use
Future Perspectives:
Saline Agriculture (Halo-Culture): An Opportunity for Saline Soils and water Use
Formation of the Command Center for Preservation of Agricultural Lands
Satellite Based Survey of Agricultural Lands (online services by Use of GIS and RS based systems)
Cadaster for Agricultural Lands (1:2000 scale)
Collecting data and Up-to-date information about soil characterization of farm holders by the means of questionnaires and field survey

References

[1] Maleki, Saadat and Bhrami, 2022; The Salinity and Irrigation Methods Affect the content of macronutrients in different organs of Quinoa.

[2] FAO ,2000; Soil Map of the World. Rome: Food and Agriculture Organization of the United Nations.

International Network of Salt-Affected Soils

Managing salt-affected soils for sustainable future