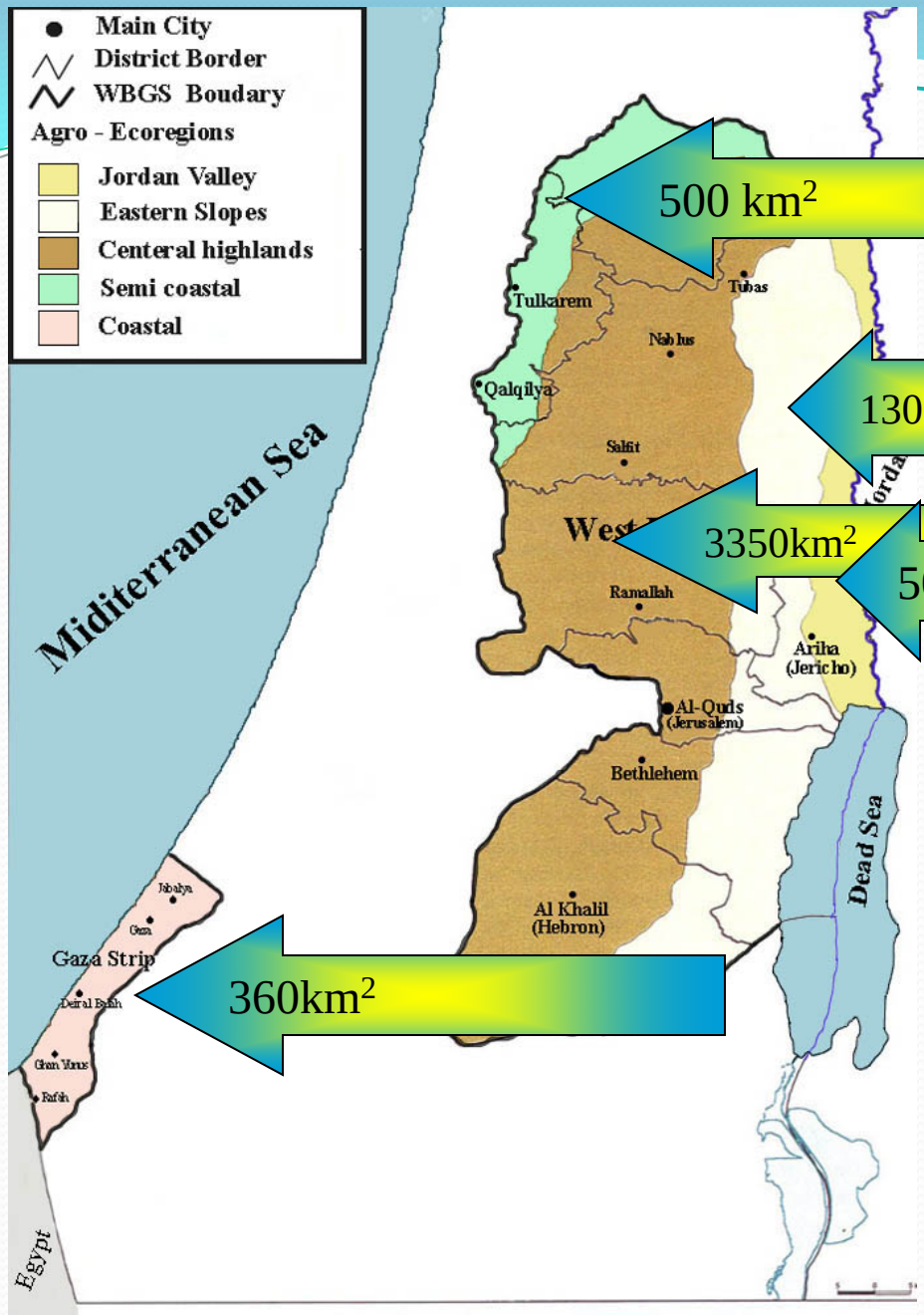
THE SOILS OF PALESTINE: CURRENT STATUS AND FUTURE TRENDS

Prepared by

Imad Ghanma

Ministry of Agriculture

General Directorate of soil and irrigation


Main City
District Border
WBGS Boudary
Agro - Ecoregions
Jordan Valley
Eastern Slopes
Centeral highlands
Semi coastal
Coastal
Mediterranean Sea
Tulkarem
Tubas
Nablus
Qalqilya
Salfit
Ramallah
Ariha (Jericho)
Al-Quds (Jerusalem)
Bethlehem
Al Khalil (Hebron)
Dead Sea
Gaza Strip
Jabalya
Gaza
Deir al Balah
Khan Yunis
Rafah
Egypt
500 km2
1300km2
3350km2
506km2
360km2

Agricultural Sector Strategy: A Shared Vision / 2011-2013

- Agriculture is an essential component of the Palestinian national, cultural, economic and social fabric.
- The Ministry of Agriculture and other relevant institutions have prepared several policies, strategies and plans for the development of agricultural sector with certain visions and assumptions, which regrettably did not materialize due to the continuous Israeli stubbornness and rigid position.
- This Strategy has been designed to respond to the PNA trends and instructions on the preparation of a set of sectoral and cross-cutting strategies as a primary approach to develop the 2011-13 Palestinian National Plan (PNP)

The Agricultural Sector Vision

- The vision constitutes the frame work, the guide and the general objective which the agricultural sector is targeting within the next stage. The agricultural priorities, policies, plans and projects are derived from the vision which will be built on the reality and status of the agricultural sector

  Within this frame, the future vision for the Palestinian agriculture is:

- **Sustainable and feasible agriculture, that is capable of achieving food security, competitive in the local and foreign markets through an optimal use of resources as part of comprehensive development, and cementing the bonds and sovereignty of Palestinians over their land, there on towards building the state.**

Policies targeting the effective and sustainable management of agricultural resources throughout the Palestinian territory

- **Sustainable use, increasing the area, reclaiming the land and sustainable use of agricultural biodiversity:**
- This policy aims to increase and green the area of agricultural land as well as to construct agricultural roads in order to protect land against erosion or deterioration and protect wildlife and agricultural biodiversity. This policy will brought about by implementing the following interventions:
- Identify, classify and reclaim lands and enhance productivity
- Afforest government and privately-owned land
- Develop and rehabilitate rangelands
- Conserve and sustainably use agricultural biodiversity

SOWT analysis

Strengths	Weaknesses
- Available public agricultural institutions, which have been established in a relatively good manner, along with a large-scale geographical coverage. - Active NGOs and civil society organizations - Availability of qualified staff in certain tasks - Modem and comprehensive agricultural law - Availability the basic structures and infrastructure such as universities, community colleges, training centres and research centres - Diversified climate suitable for several agricultural production systems - Skilled and committed farmers to their land and to farming - Good experience in dealing with emergencies and crises - Availability of human resources with potential capabilities - Integral relations and positive cooperation between private and public sectors in agriculture	- Low productivity and profitability attained from agriculture, and weak efficiency of using the resources and inputs - High potential of being affected by climate change and fluctuated prices - Weak performance and inappropriate organization structures, number of staff and functions in addition to weak coordination between institutions of the agricultural sector - High profit margins of the merchants, especially the Israelis - Lack of a national umbrella for planning and comprehensive supervision of the agricultural sector, as well as weak participation in decision making - Weak service delivery system and provision of agricultural inputs - Weak agricultural education system

Opportunities	Threats
- Arab and international sympathy and support to the PNA and to the 13th Government Programme *Palestine: Ending the Occupation and Establishing the State*. - Increasing awareness around the world and amongst members of the donor community of the significance of supporting agricultural development - Palestinian agricultural products have access to Arab countries with an exemption from customs fees - Sympathy and support to Palestinians/products of the in external markets. - Commercial agreements concluded with states, Arab and international entities. - High potential for agri-tourism	- Israeli reactions that aim to dismantle the plan of ending the occupation and establishing the State as well as to undermine the security and political situations - Continued policies of land confiscation, seizure of water sources, wall construction, settlement activity and division of the Palestinian territory - Limited budgetary appropriations for agriculture - Lack of land use plans and regulations - Flooding the local markets with Israeli and settlements' products; restricted movement of individuals, services and commerce - High costs of inputs - Increased and recurrent years of drought

Water resources

- Water available for agriculture amounts to 150 million cubic metres (mcm) per annum, and constitute, 45% of the total water used distributed to 70 mcm in the West Bank and 80 mcm in the Gaza Strip. Ground water wells are the main water source for irrigation in the Gaza Strip. In the West Bank, irrigation water is supplied by groundwater wells and springs, and Israel confiscates 82% of Palestinian ground water in the West Bank. The 2009 World Bank report on Palestinian water sources indicates that removal of Israeli restrictions and provision of additional water quantities will raise agricultural sector's contribution to the Gross Domestic Product (GDP) by 10% and will create approximately 110,000 additional job opportunities

Land resources

- The cultivated area is estimated at 1.854 million dunums, or 31% of the total area of the WBGS out of which 91% in the West Bank and 9% in the Gaza Strip. The rain-fed area constitutes 86% while the irrigated area constitutes 14% of the total cultivated land, the rangeland amounts to 2.02 million dunums. However, the area available for grazing is only 621 thousand dunums. In addition, forests stretch over an area of 94 thousand dunums.

Historical Overview

The soils of Palestine have been the subject of many studies since the beginning of the last century.

- The first soil survey was made in 1927-28 by Strahorn from the American Bureau of Soils. He surveyed almost 4.9 million dunums of the low-lands of Palestine. Maps at a scale of 1:40,000 and 1:63,000 were used in the field, and the data were then assembled on a 1:250,000 map.

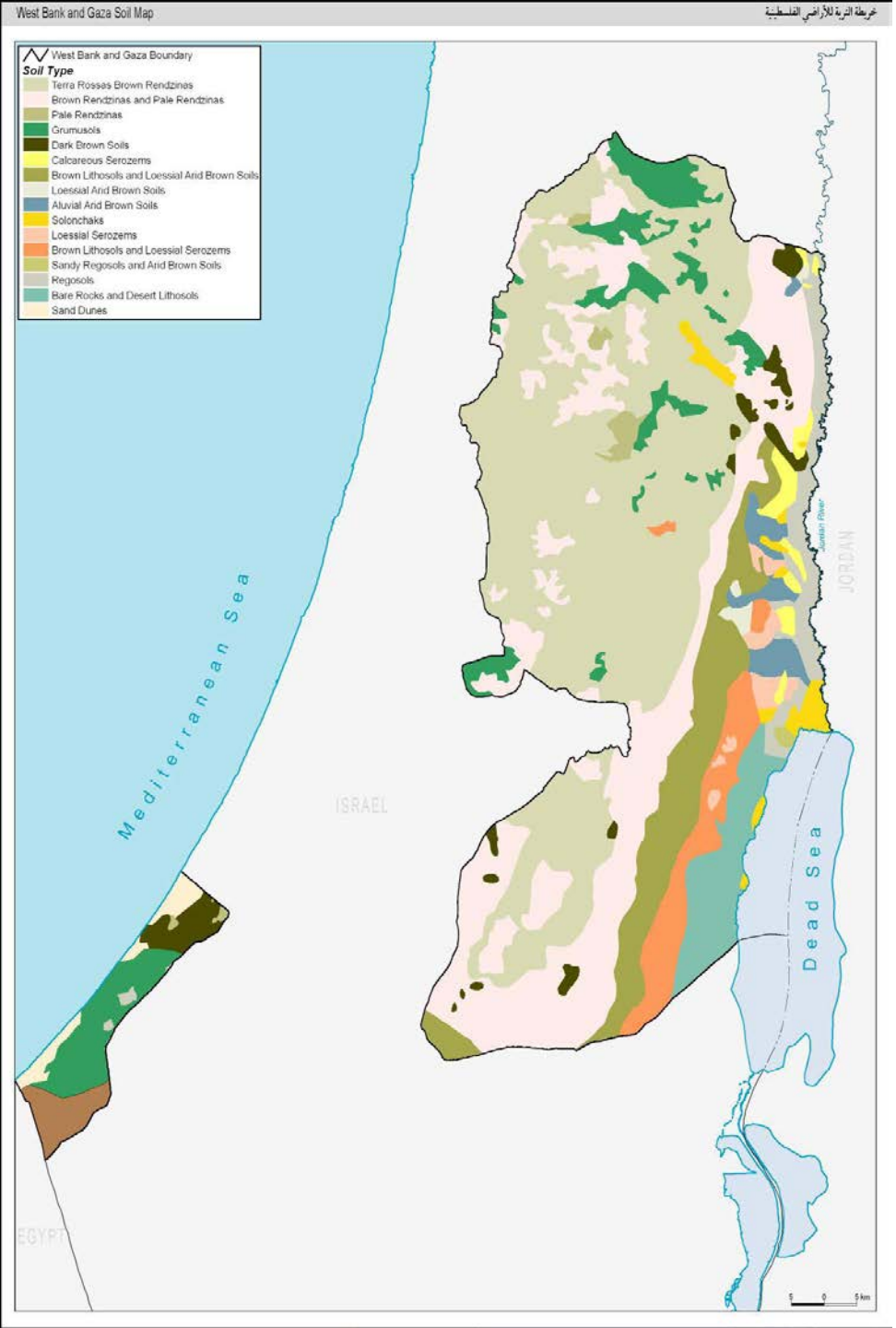
- Zohary (1942) studied the relations between vegetation and the various soil formations, and based upon field reconnaissance observations he published a generalized soil map at a scale of **1:600,000**. He defined 11 soil types and introduced the Rendzina group into the local nomenclature.

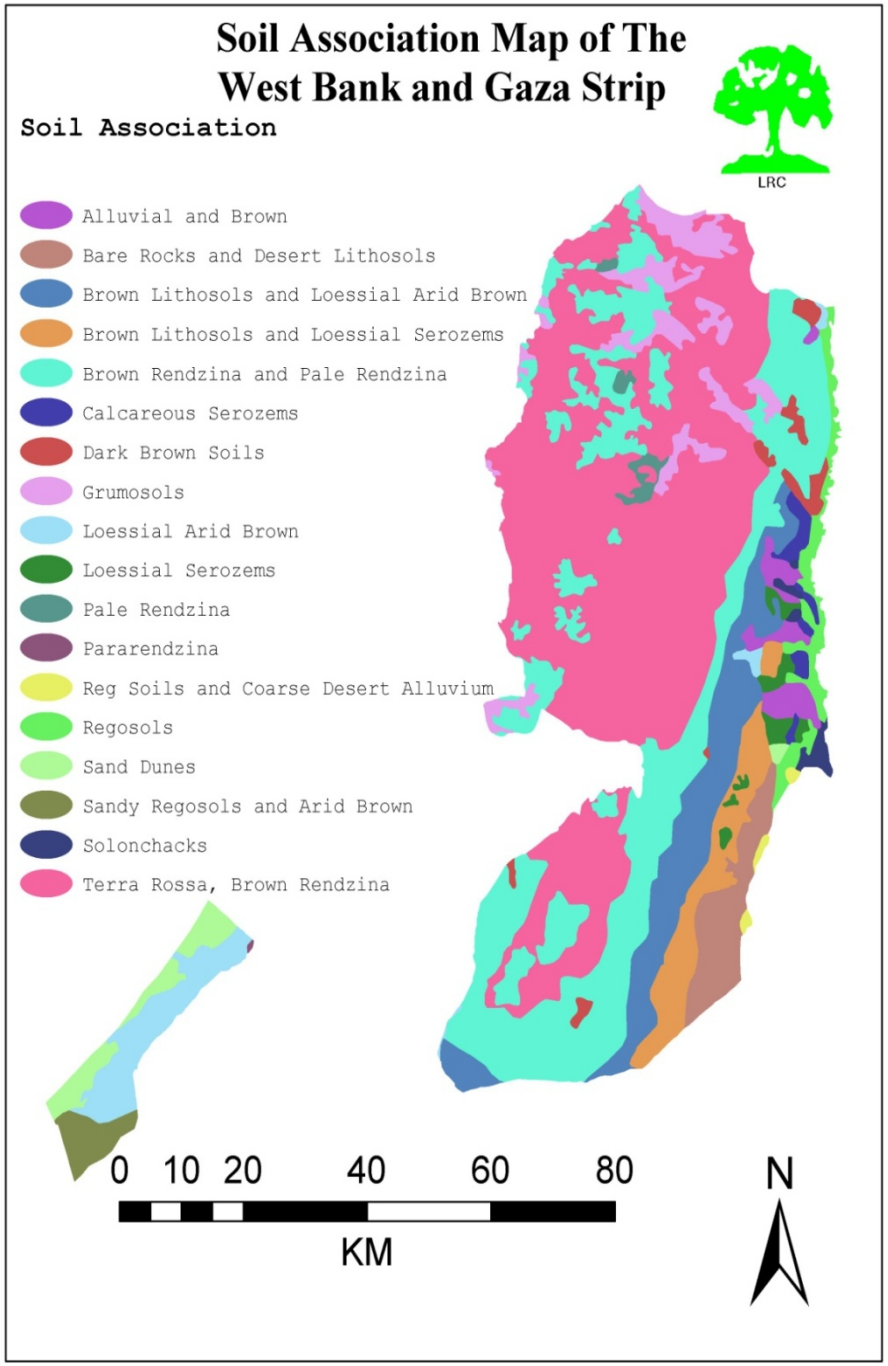
Reifenberg and Whittles (1947) studied in details the chemical properties of most soil types occurring in Palestine, and compared their composition to that of subjacent rocks. They published a schematic soil map at a scale of 1:1.6 million, which relies heavily on the geological map.

- Rosensaft and Gil (1955) through the USDA Soil Conservation Service published a soil type map at scale of **1:500,000** on which 13 soil types were distinguished.

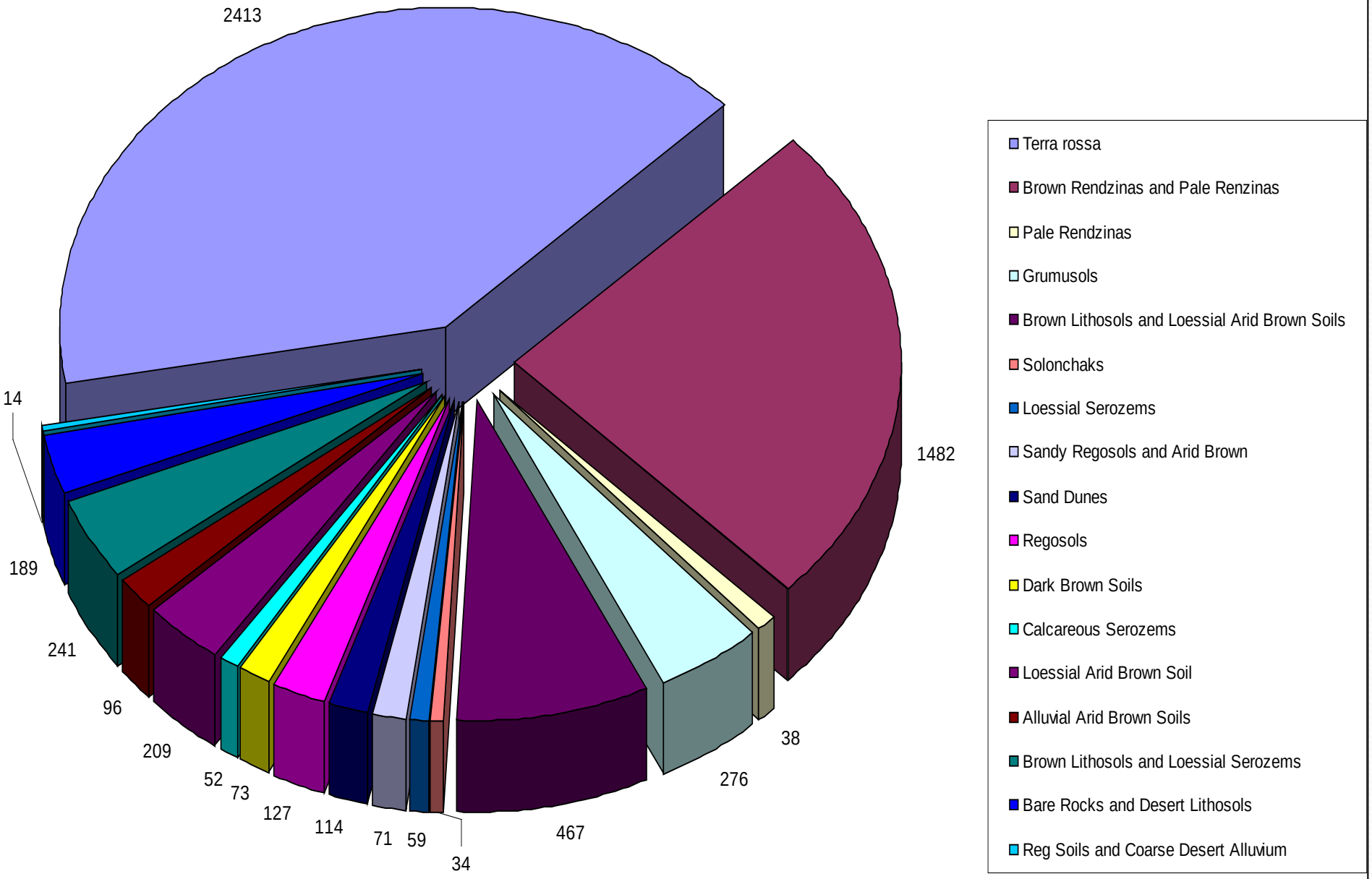
- Dan et al. (1962) described the soils and mapped them on the basis of soil associations. A map having a scale of **1:250,000** was prepared. There are 17 soil associations included in this map.

- Dan et al. (1976) reclassified and mapped again the soils of Palestine. They used the physical properties as a basis for their classification and divided the soils into 34 units accompanied in 20 soil associations. In 1976 they published a soil map at scale of **1:500,000**.


West Bank and Gaza Soil Map
غريطة التربة للأراضي الفلسطينية
West Bank and Gaza Boundary
Soil Type
Terra Rossas Brown Rendzinas
Brown Rendzinas and Pale Rendzinas
Pale Rendzinas
Grumusols
Dark Brown Soils
Calcareous Serozems
Brown Lithosols and Loessial Arid Brown Soils
Loessial And Brown Soils
Aluvial And Brown Soils
Solonchaks
Loessial Serozems
Brown Lithosols and Loessial Serozems
Sandy Regosols and Arid Brown Soils
Regosols
Bare Rocks and Desert Lithosols
Sand Dunes
Mediterranean Sea
ISRAEL
JORDAN
Dead Sea
EGYPT

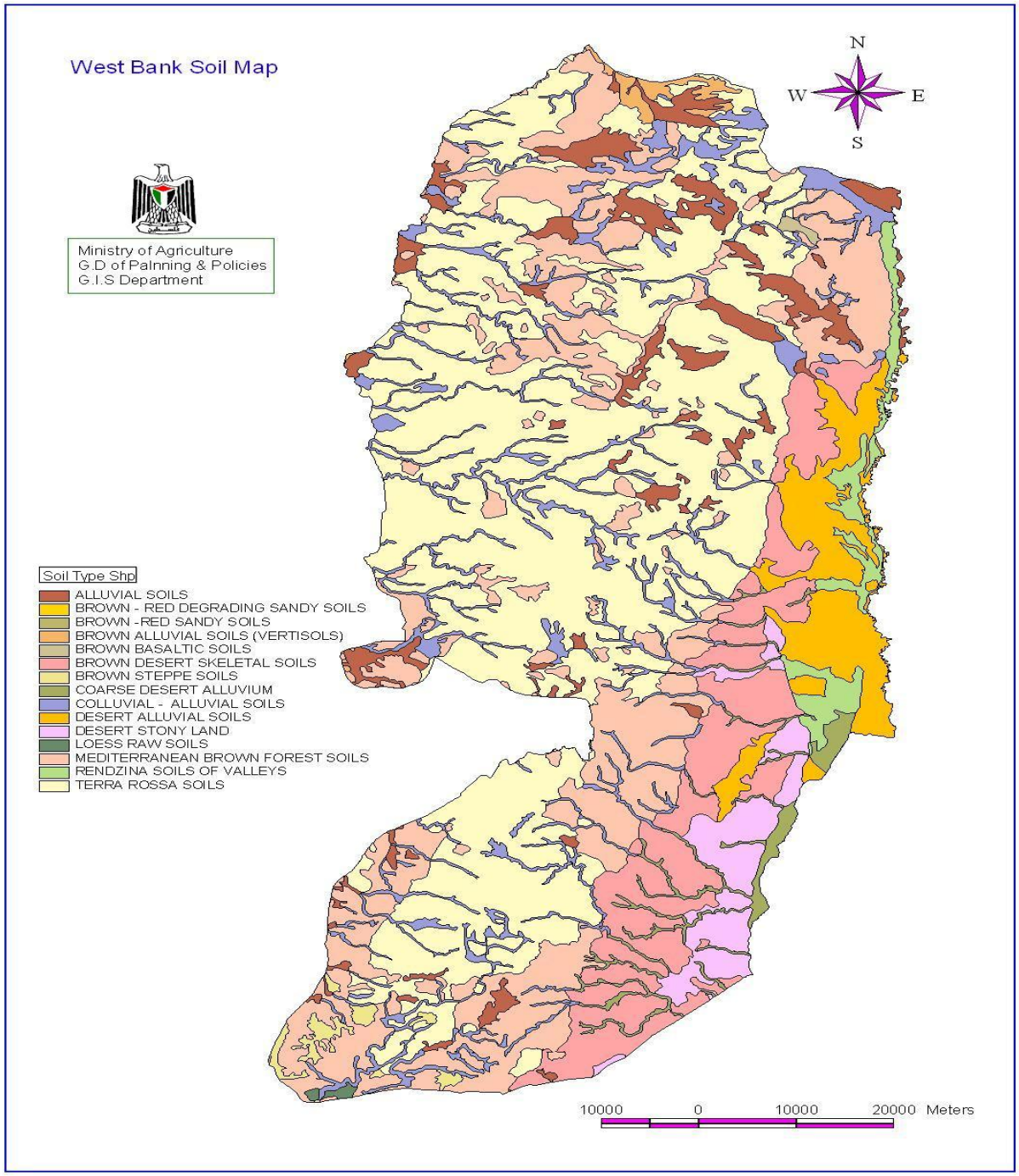

Soil Association Map of The West Bank and Gaza Strip
Soil Association
LRC
Alluvial and Brown
Bare Rocks and Desert Lithosols
Brown Lithosols and Loessial Arid Brown
Brown Lithosols and Loessial Serozems
Brown Rendzina and Pale Rendzina
Calcareous Serozems
Dark Brown Soils
Grumosols
Loessial Arid Brown
Loessial Serozems
Pale Rendzina
Pararendzina
Reg Soils and Coarse Desert Alluvium
Regosols
Sand Dunes
Sandy Regosols and Arid Brown
Solonchacks
Terra Rossa, Brown Rendzina
0 10 20 40 60 80
KM
N

Soil Associations in Palestine



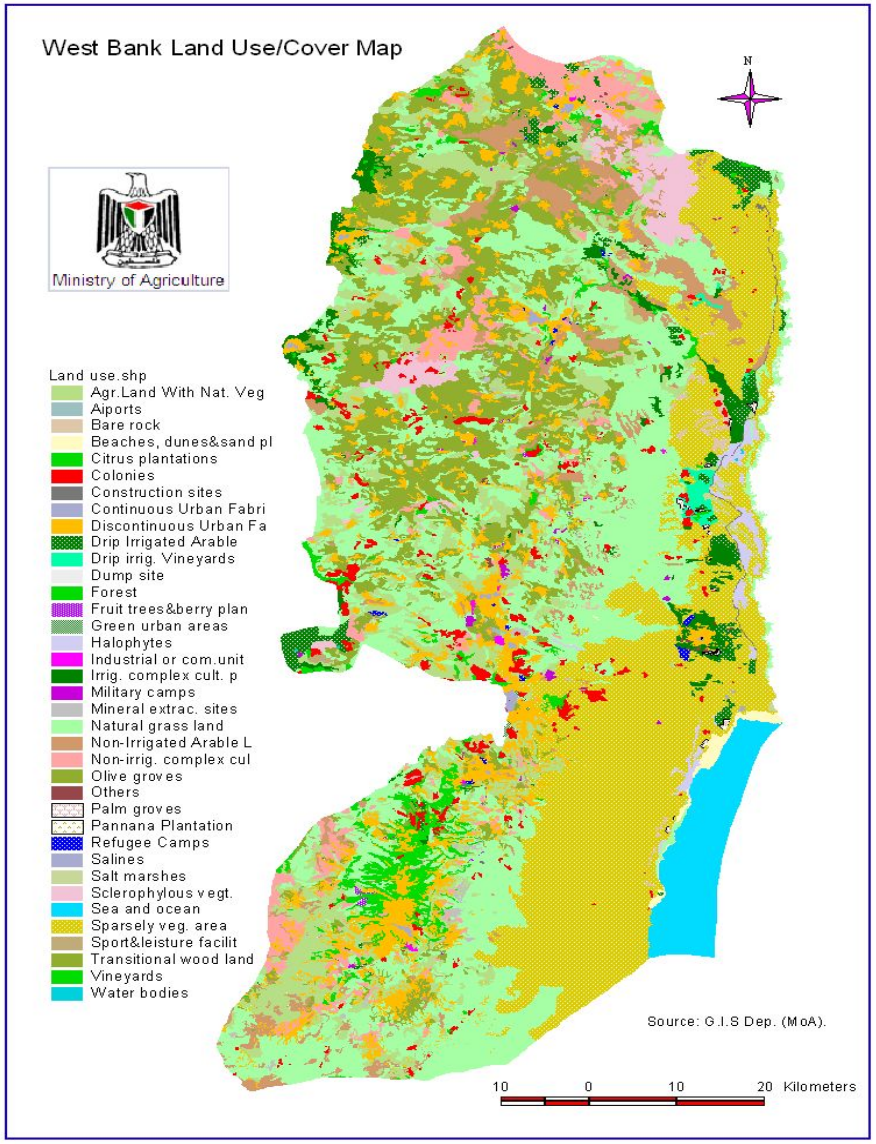
Another Israeli Soil map digitized by ministry of agriculture 2000.

it was classified the soil in west bank into 15 soil type



Land Use

- Updated land cover and land use map produced jointly between MoA and MoP 2008
- It contains 37 different classes



- Map of Valuable agricultural land was produced jointly by MoA and MOPIC 1998

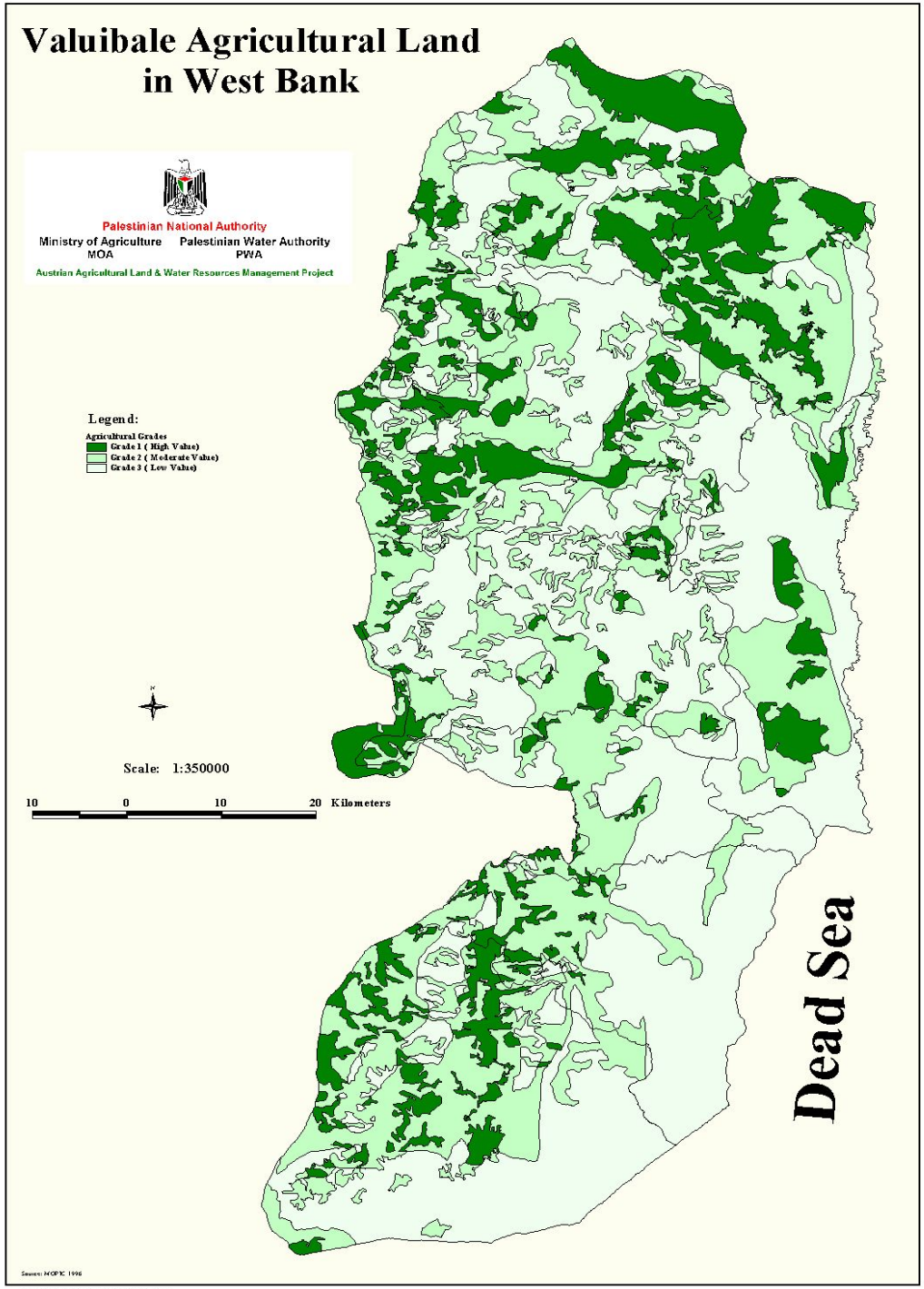
--Land was classified into three main categories according to land productivity value

highly value

moderate value

low value

--Updating this map will start soon under the project of National spatial planning

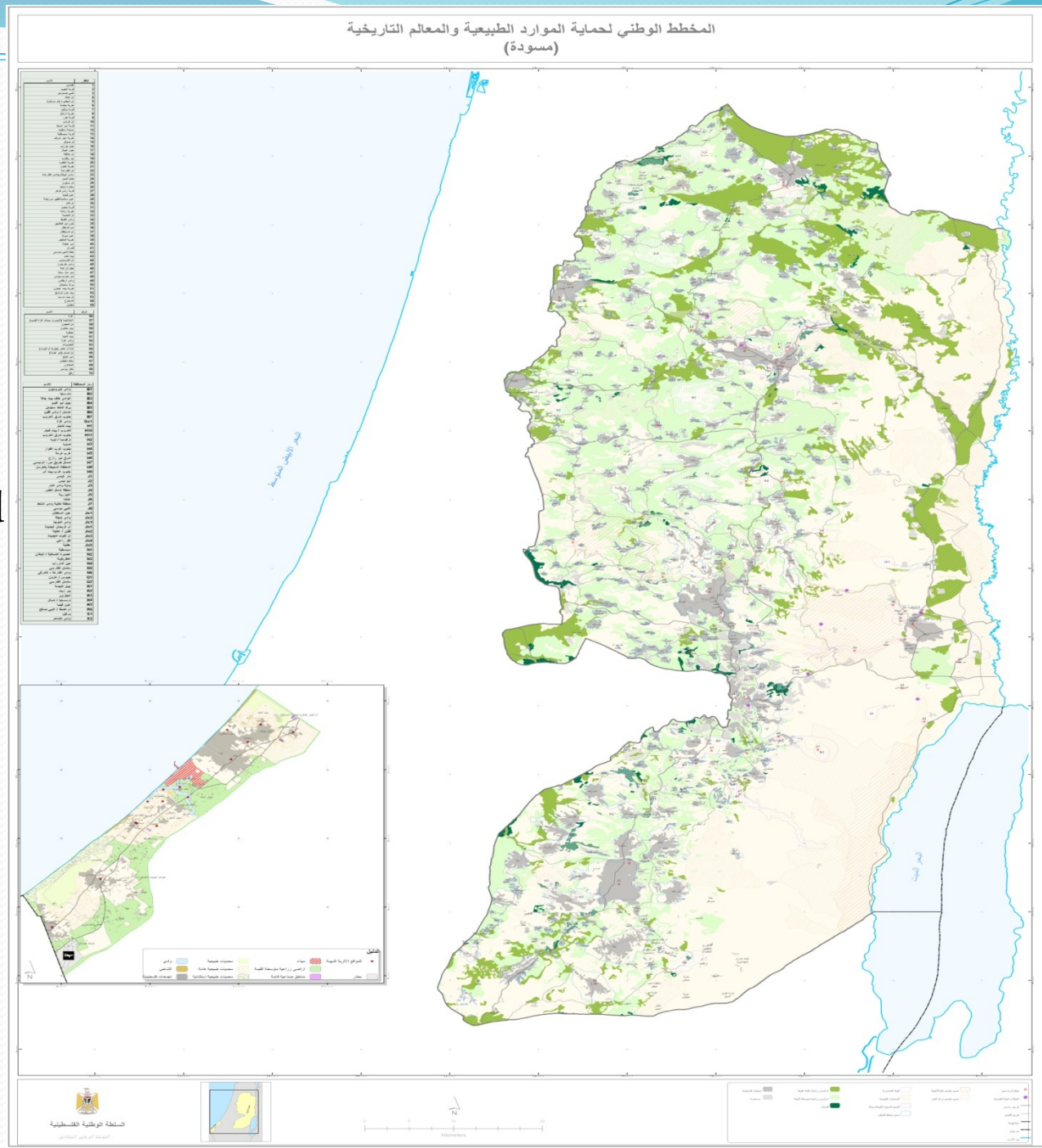


Under National spatial planning Project,(on going project) all stakeholders agree to divide the agricultural land into three categories ,Highly protected area

medium protected

and low protected area

depending on several parameters

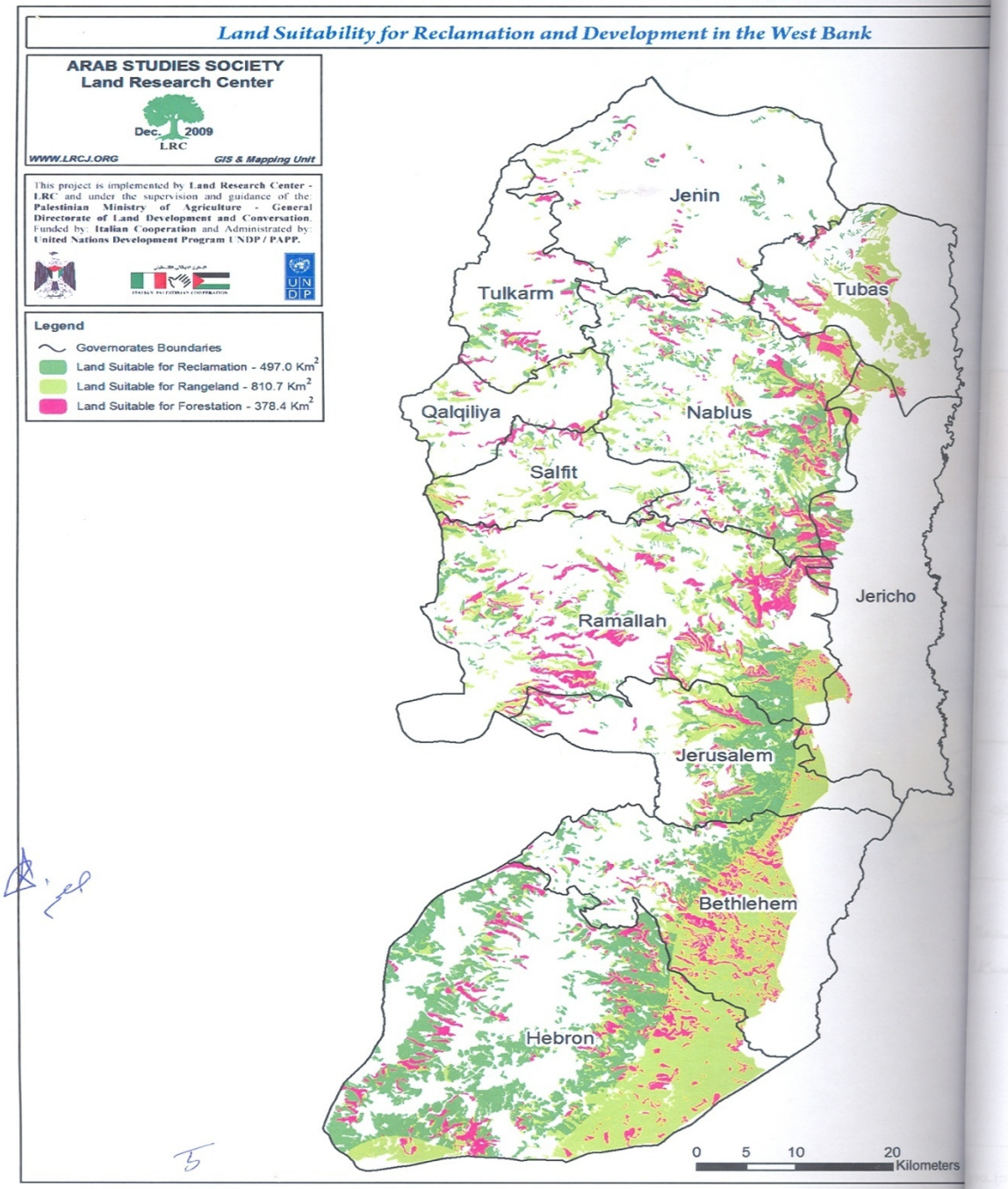


2010 MoA and LRC were classified land according to suitability for reclamation into 3 categories

--Land suitable for reclamation

--Land suitable for Rang land

--Land suitable for forest

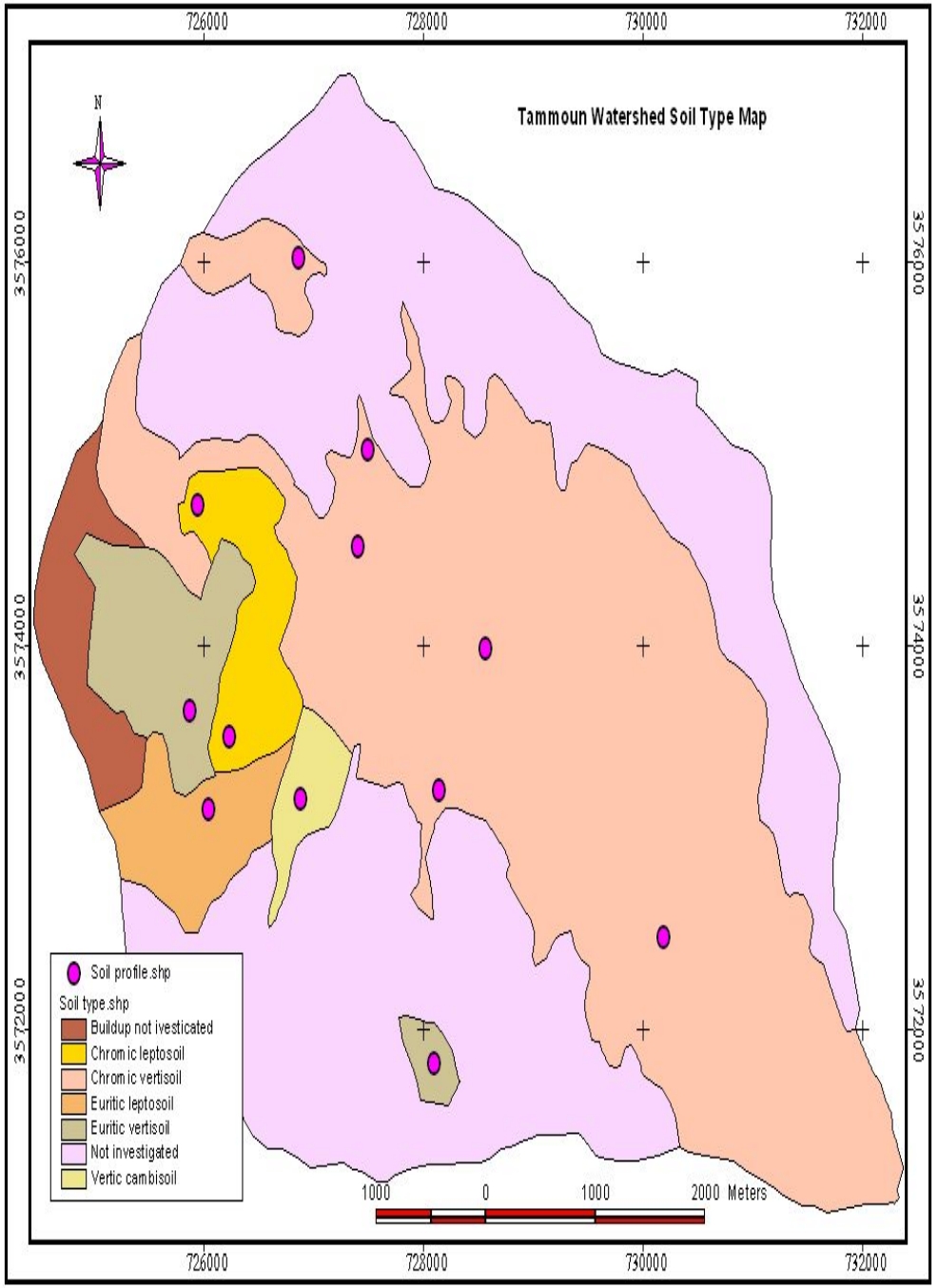


Soil type map for tammun watershed project

Comprehensive soil survey were in the project area according to ISRIC FAO

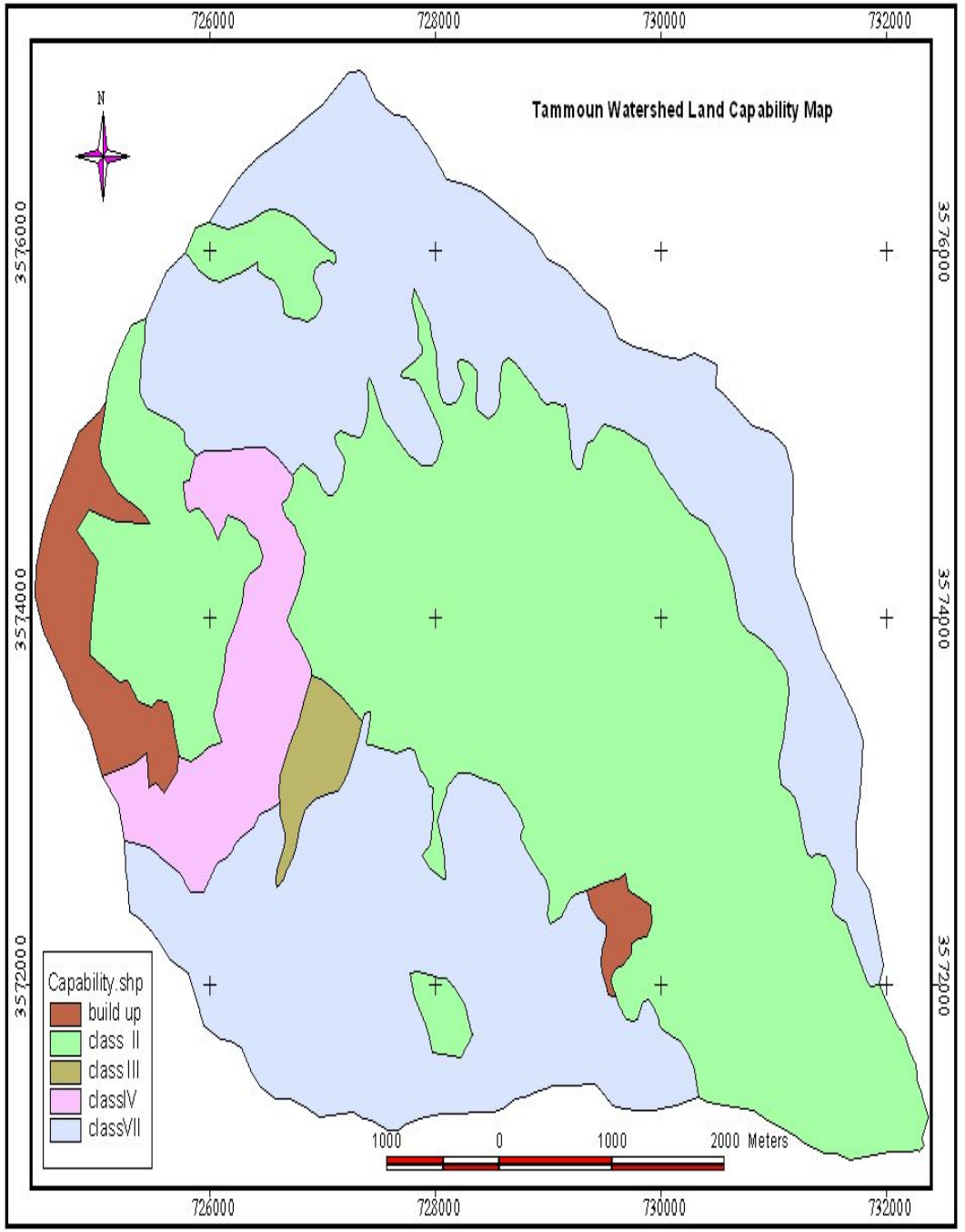
13 soil profile and 60 soil Auger where done

3 soil type as great group and 5 subgroup where define in the studied area



- Land capability map for tammoun area also done according to the USDA capability classification 4 classes were defined

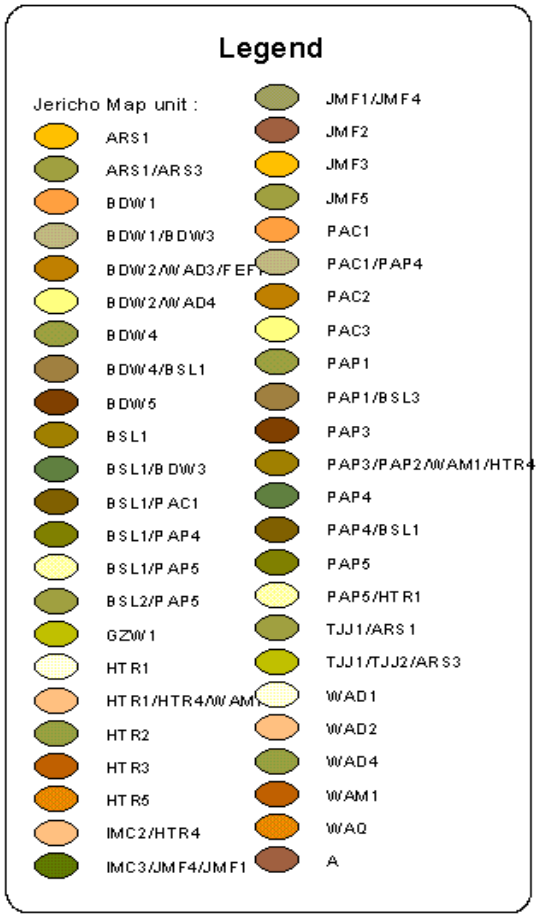
- Land suitability map for tammoun area also done according to the FAO suitability classification



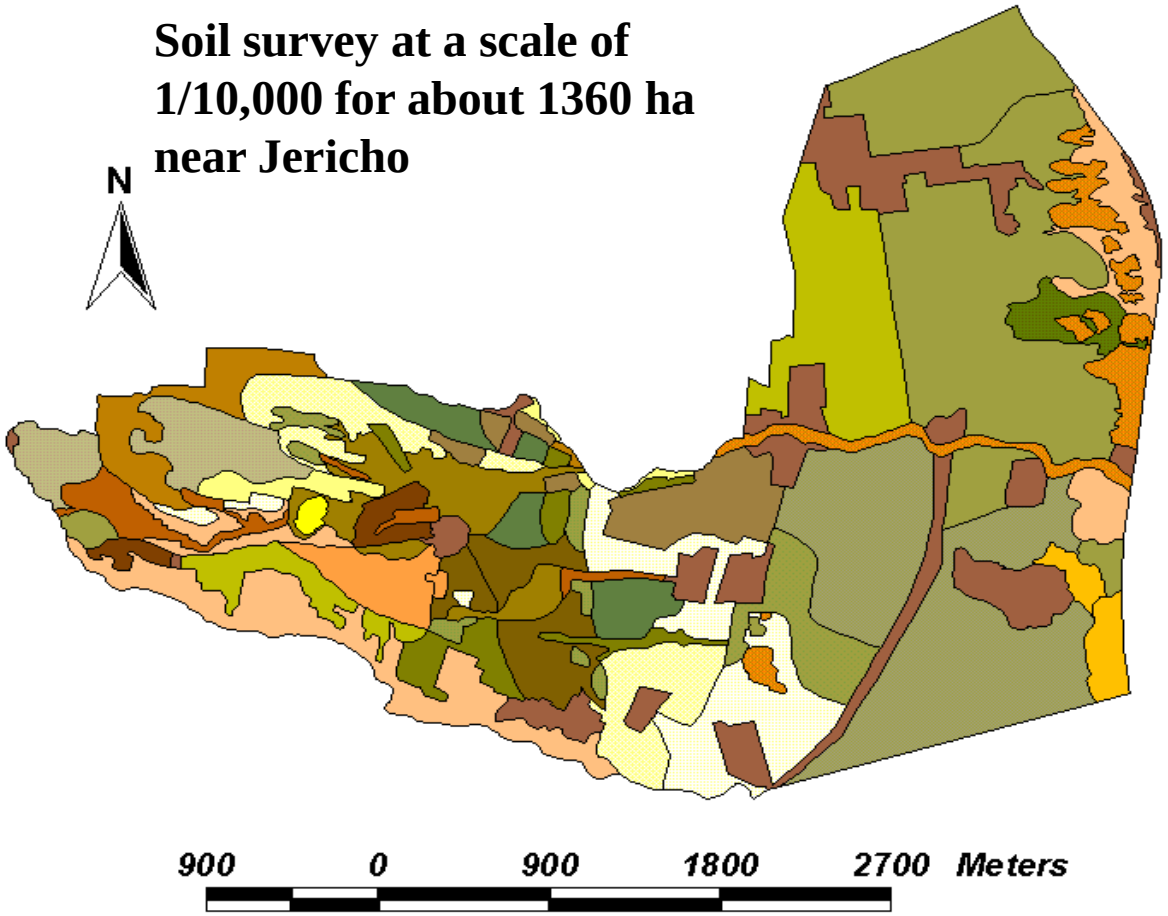
Soil Map of Jericho Area

Arab Studies Society

Land Research Center



Soil survey at a scale of 1/10,000 for about 1360 ha near Jericho



SOLONCHAKS, GYPSISOLS, SOLONETZ, CALCISOLS, CAMBISOLS, FLUVISOLS.

Aridisols, Entisols

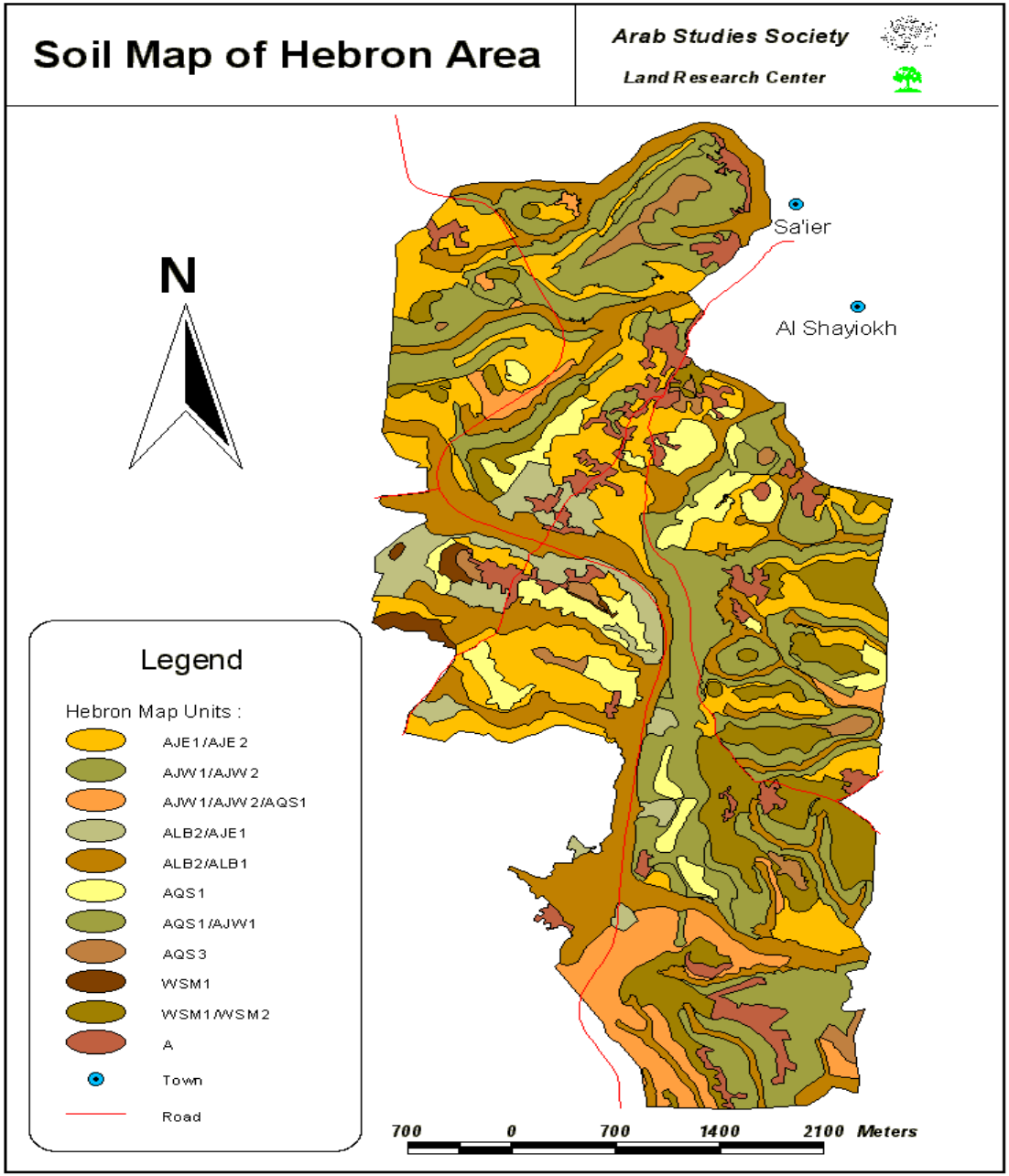
14 soil types and 43 phase

Soil surveying at a scale of 1/25,000 for 1731 ha

VERTISOLS, LUVISOLS, CAMBISOLS, LEPTOSOLS.

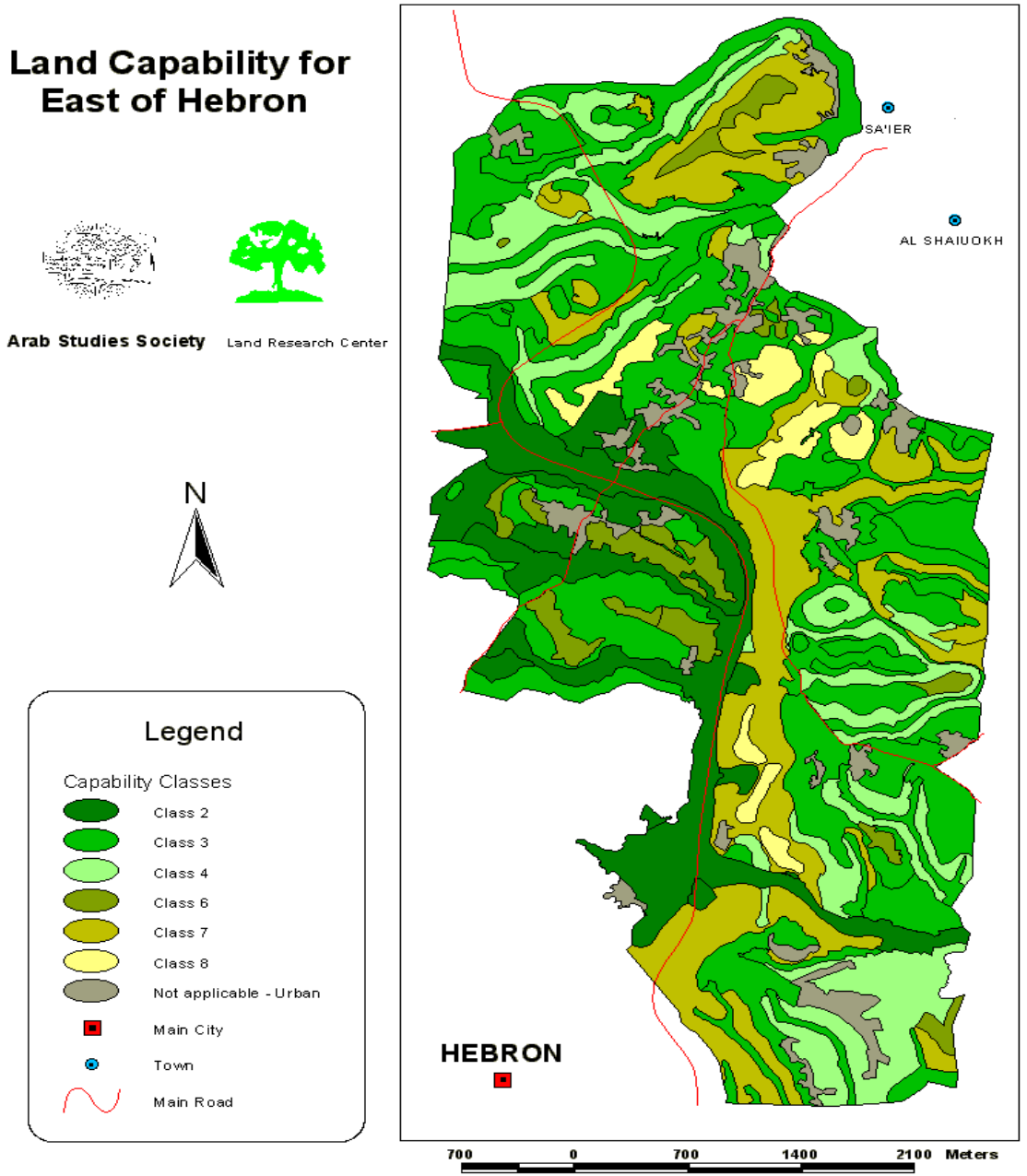
Vertisols, Alfisols, Inceptisols, Entisols

5 soil types and 12 phase



Land capability map according to USDA capability classification map for small area in Hebron

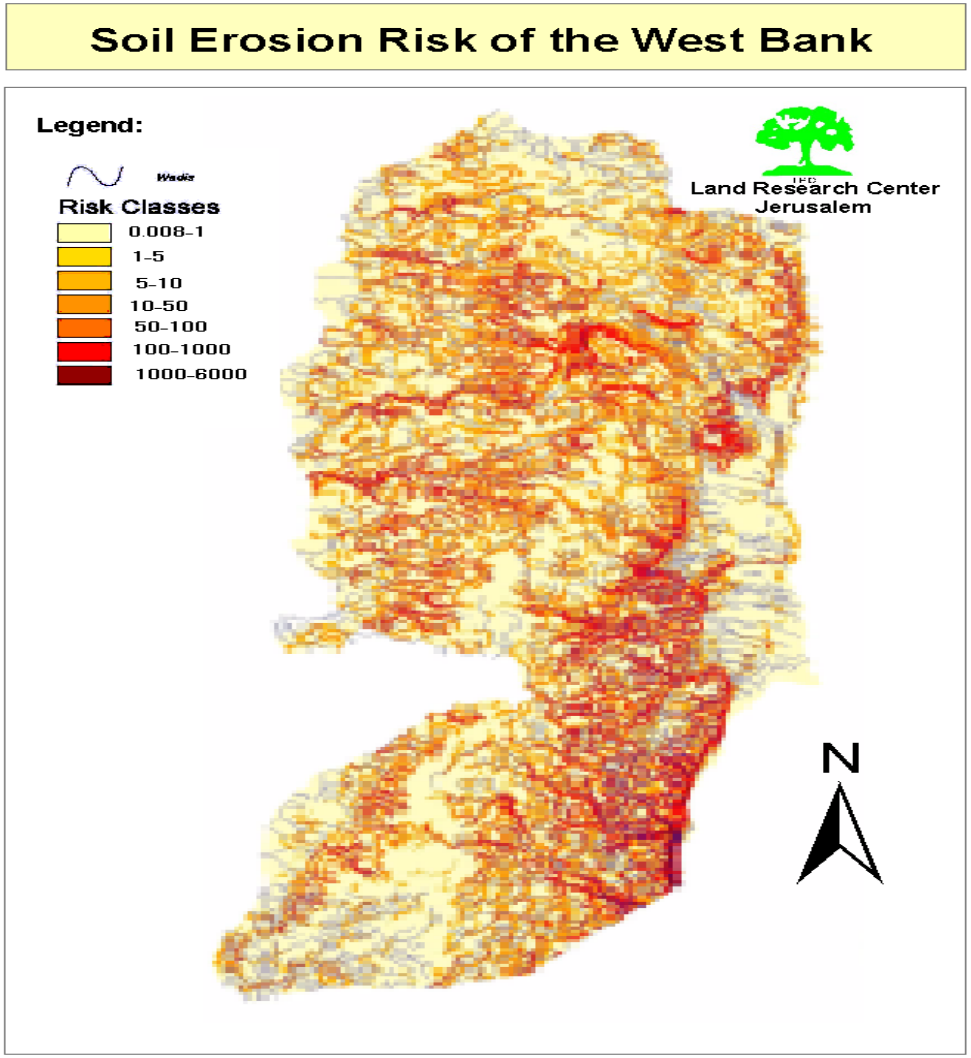
7 capability classes were defined



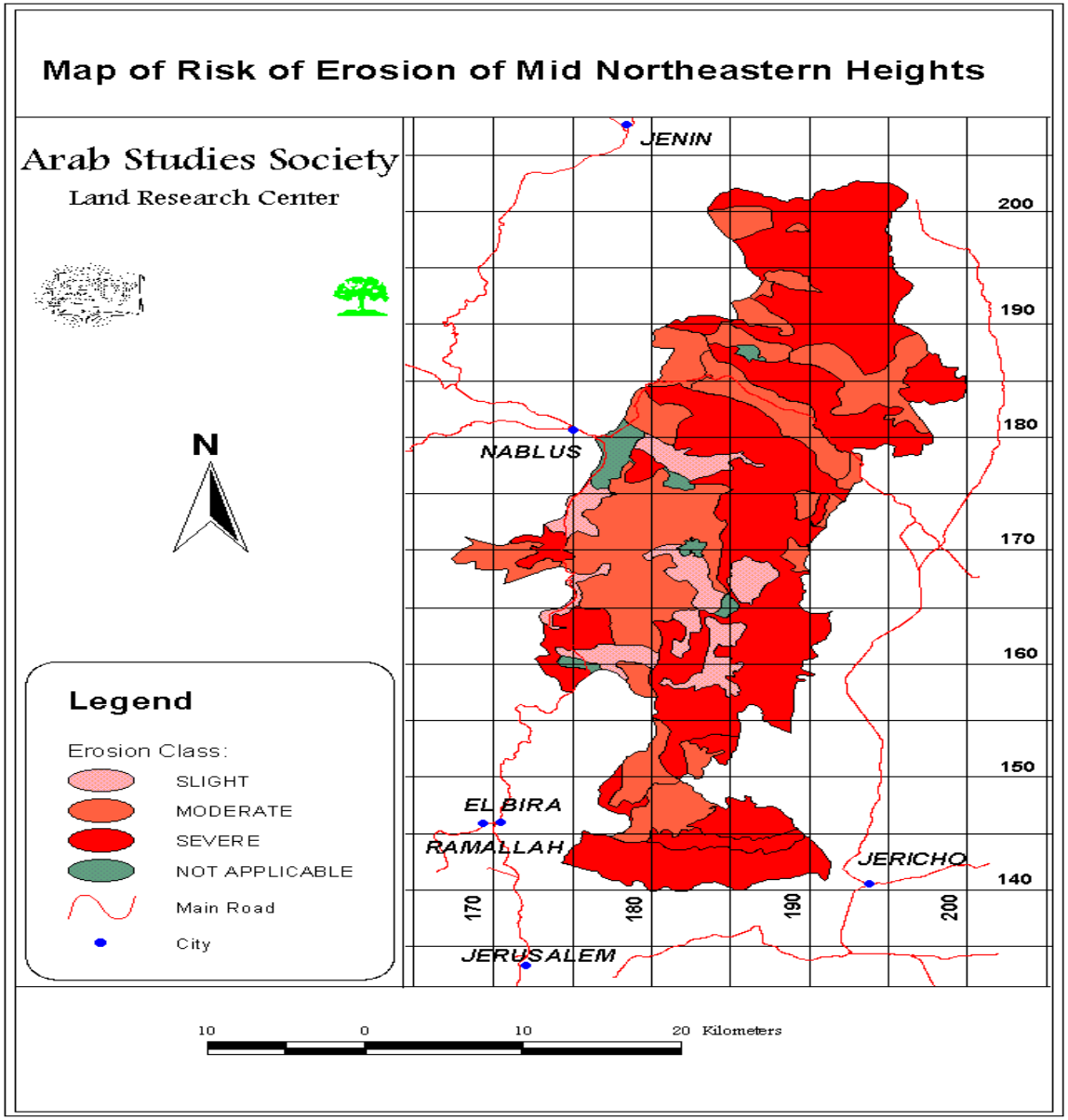
Environmental Problems Related to Soils

Soil Erosion

- Almost all types of soil erosion are taking place in the West Bank and all these types are accelerated by human activities. Recently soil erosion risk map under publishing for 6 scattered sites implemented by MoA and LRC und Brazilian project (ongoing project)
- based on the methodology implemented in COoRdination of Information on the Environment (CORINE) model



Soil erosion risk maps in small selected area in west bank conducted by LRC in the area of northeastern heights



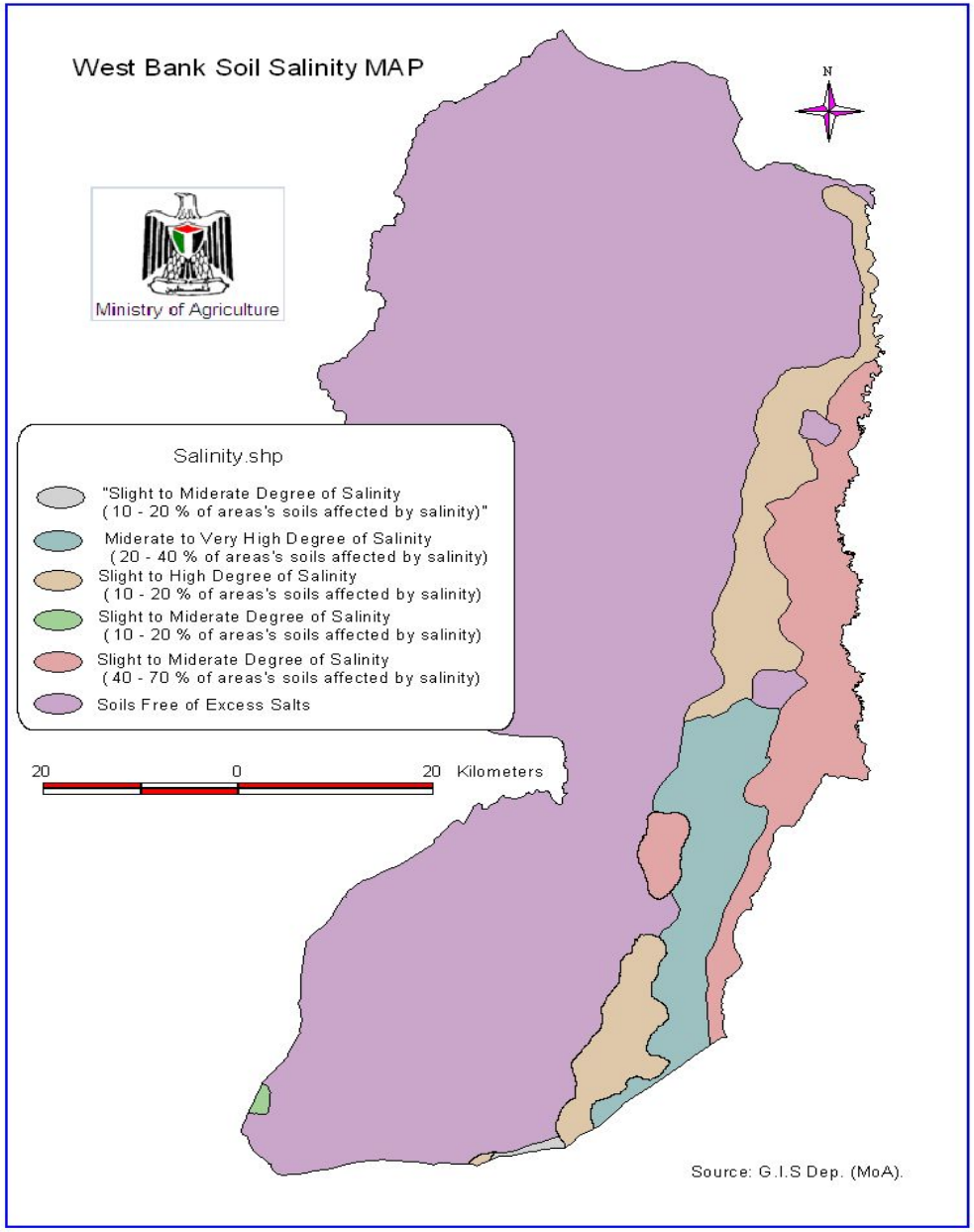
Soil salinity

The lacustrine parent material in Jordan Valley is an important source of soil salinity in this area

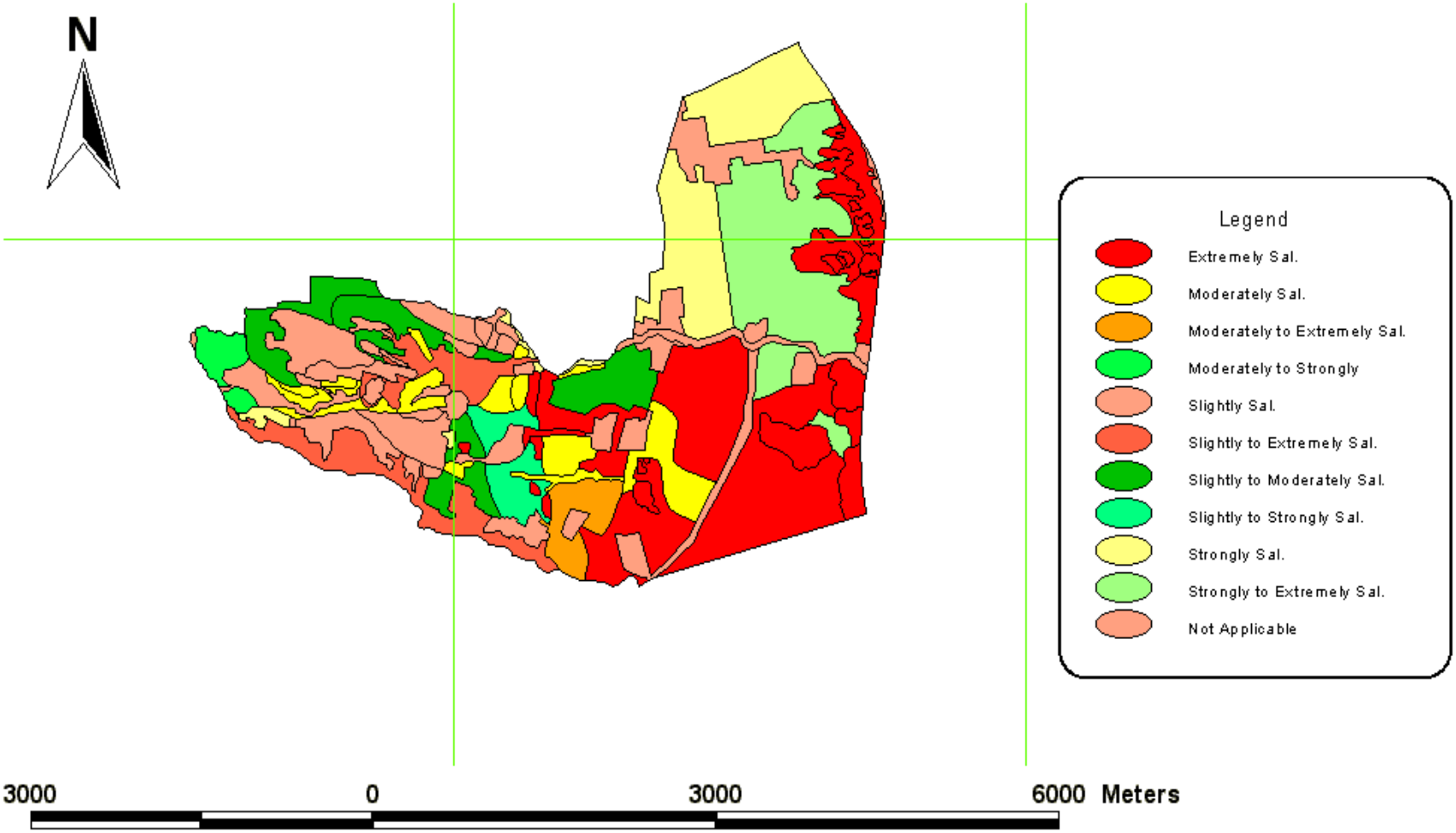
In addition to other resources like using saline water in irrigation and miss management

Salt affected soil and saline soil are widespread along Jordan valley.

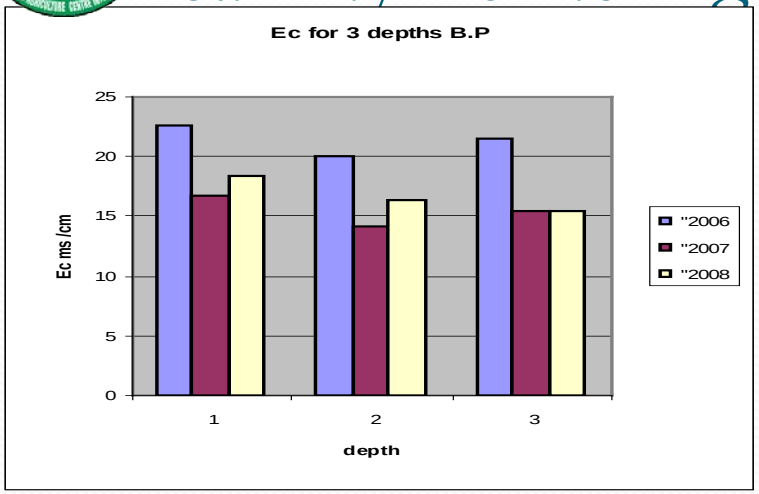
Salinity survey and management are now conducting on small area

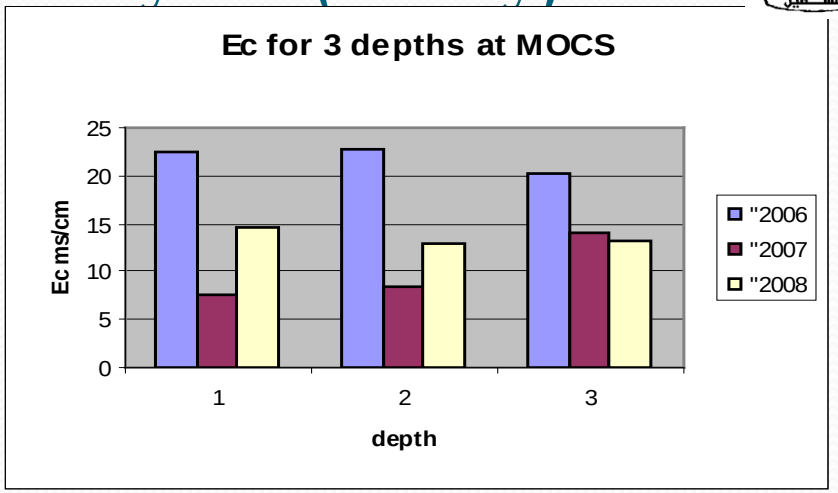


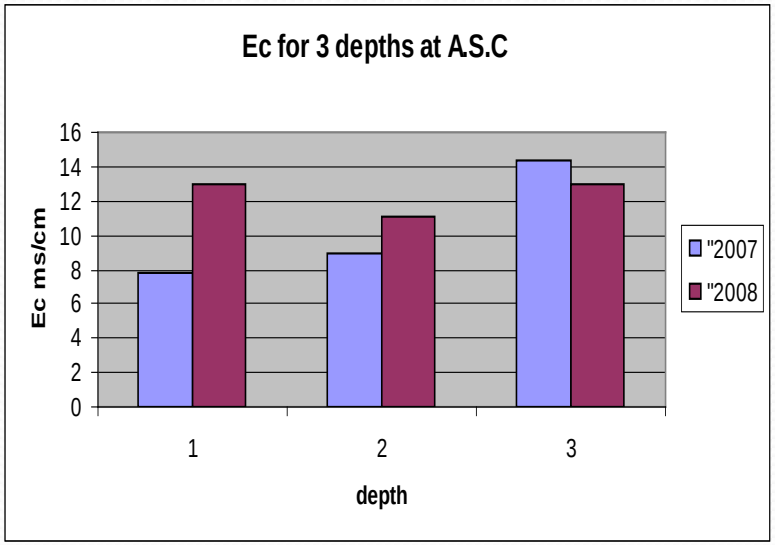
Salinity of Soil Map Units in Jericho Area



Salinity monitoring for 3 years (barley)

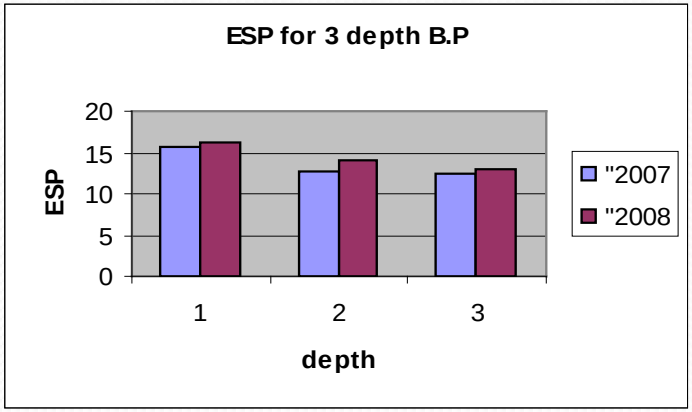


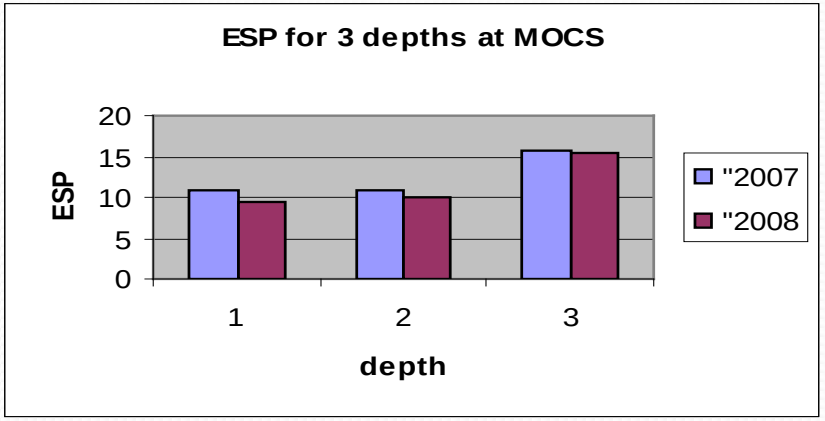


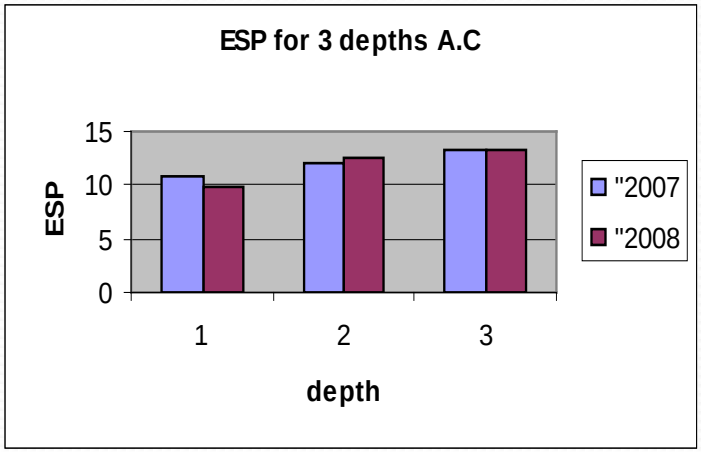


- Soil salinity in the demo farm before planting was 20-22 ms/cm during 2006 and 12-17ms/cm in 2007 15-17ms/cm in 2008
- but in the MOCS soil salinity in 2006 was the same 20-22ms/cm and in 2007 Significant decreasing in the salinity were noticed the range was 7-13
- In 2008 the range was 13-15 ms/cm after completion no available data in 2006
- but comparing between 2007 & 2008 slight deference in Ec in the second and third layers but in the surface Layer a big deference was noticed between 2007 & 2008

ESP monitoring for 2 years (barley)







- The range of ESP exchangeable sodium percentage before planting was from 12.9-16.2 and the highest values was in surface layer then it decreased slightly within the depth
- In the MOCS ESP is decreased from 6-10 especially in surface and sub-surface layer and still high in the third depth

Soil Contamination

Pesticides and Insecticides

There are several causes for soil contamination in the West Bank. Pesticides and insecticides are the main soil contaminant in irrigated areas

Total irrigated area about 870 000 dunum

Unfortunately some of the used pesticides are internationally forbidden.

Excessive Use of Fertilizers

The excessive and uncontrolled use of fertilizers is another source of contamination for both soil and groundwater. It is considered one of the salinity resources in the soil and to ground water.

Soil Sealing

- The rate of soil loss due to surface sealing is relatively high in Palestine. Urbanization and transport infrastructure is rapid either by Palestinians or the expansion and establishment of Israeli colonies and confiscation of land.

- In the eastern parts of the West Bank, livestock have to be herded for long distances in search of water and suitable pasture, resulting in serious trampling due to the increased traffic by animals.

Decline of Soil Fertility

- The above mentioned pressures in addition to other factors as the uncontrolled fertilizers application clearly lead to the decline in organic matter, loss of nutrient elements and an increase in toxicity scale.

- There are no systematic recording of soil fertility parameters that would help in evaluating the fertility status with time of soils in the West Bank and Gaza Strip.
- However, agricultural productivity in many areas indicates the degradation in soil fertility.

Reduction of Vegetation Cover

- Although forest area in the West Bank is very small (about 4900 ha - <1%), it is estimated that 23% of the forest area has been destroyed from 1971 to 1999. The majority of this destruction has been caused by the construction of Israeli colonies and military camps.

- Rangeland and natural grassland are also negatively affected in the last three decades due to the political situation. The limitation of the access to Palestinian herds resulted in intensive grazing to the remaining small area that is estimated to be about 15% of the whole rangeland area.

Loss of Biodiversity

Almost all the distinguished ecosystems in Palestine are under one type or another type of driving forces for biodiversity loss. For example, the Jordan Valley ecosystem comprising the Dead Sea is clearly threatened in terms of biodiversity loss due to land degradation.

Developing soil data base

- Structure on access form of soil data base was established in the ministry of agriculture
- These data base consist of 3 main parts
  - Site description parameters
  - Soil profile description parameters
  - soil profile –water- relationship parameters

The current GIS at the Palestinian MoA

1. Digitized Land system
2. Producing Land Use/Cover.
3. Detailed soil characteristics profile surveying data.
4. Digitized soil association map and soil type map.
5. Soil survey at different locations and different scales.
6. Digital Terrain Model derived thematic map like slope, aspect and elevation.
7. Land capability and suitability maps for several locations at large scale
8. Soil salinity maps for different location at large scale

Actions Needed

The following are suggested actions that should be conducted to reduce soil degradation at the political/institutional and technical levels:

- ✓ Adopting a strategic plan for land use at the country level;
- ✓ Activating the UNCCD national committee to take its responsibility of developing strategic framework and policy for combating desertification in Palestine;
- ✓ Improve administration, policy and plans of national institutions, human resources, research and scientific capabilities;

- ✓ Continue and intensify adopting and supervising the activities of land reclamation and soil conservation on new solid bases;

- ✓ Encourage, facilitate and provide capabilities for applied research related to soil degradation;

- ✓ Creating unified soil database at the national and regional levels.

- ✓ Utilization of household organic wastes and crop residues as fertilizer (composting) for selected crops in the farm or garden.

- NGOs and research institutions should develop technical solutions to practical problems facing farmers as fluctuating soil salinity, proper soil tillage practices, etc. This should be combined with public awareness campaigns and extension programs for farmers. This means also promoting the involvement of local people in data collection and identifying the technical problems facing them in the field.

Thanks for Listening