GIS Tools for Environmental Assessment to meet Renewable Energy Goals

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Introduction

- The identification of areas technically suitable for renewable generation involves :
- Collection of needed data, such as historical wind speed and direction, terrain and slope information, and solar radiation.
- Data must be analyzed by GIS tools to get information.

Data collection

The needed data include:

Data from metrological stations: Collected as numbers

Wind speed and duration reading

Sun intensity and number of sunny days

Data from satellite images

Land Use\Cover

Urban Areas

Protected Areas

Roads

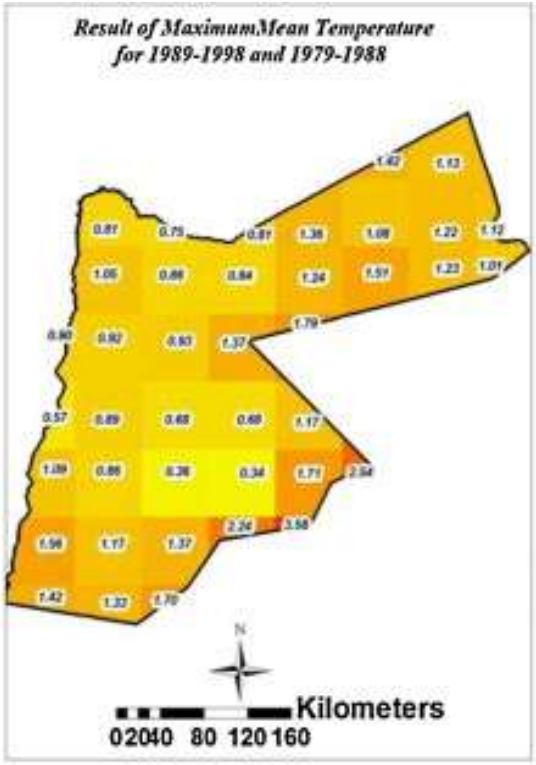
Slope of land

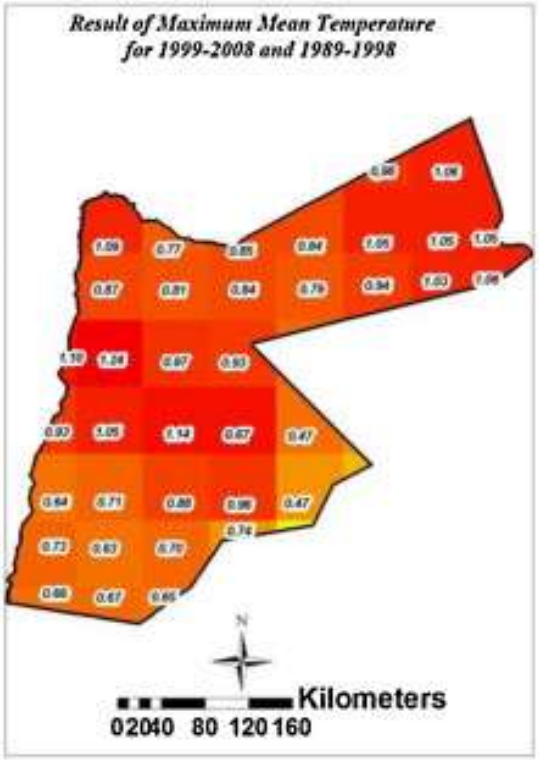
Data Analysis

- From collected data, the technical sites for renewable energy production can be selected:
- Suitability based on weather reading.
- Distance from Road
- Distance from urban.
- Slope of land.

Data from metrological stations is collected as numbers

GIS tools used to create maps from weather data





Wind Power Generation

For wind power generation: wind speed and duration must be sufficient for turbines to work.

Data from metrological stations (wind speed and duration) is used to create the wind map.

Wind suitability map: Created from wind speed and wind duration maps

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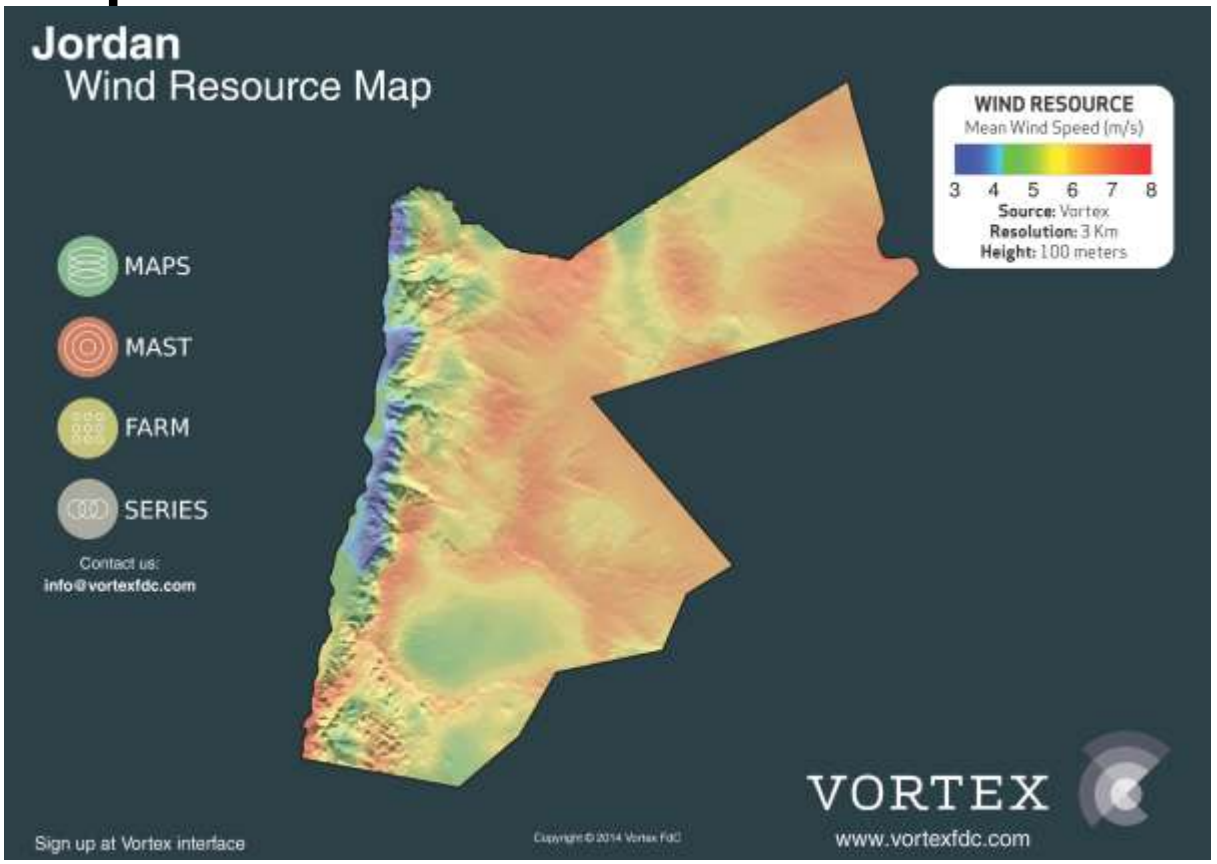


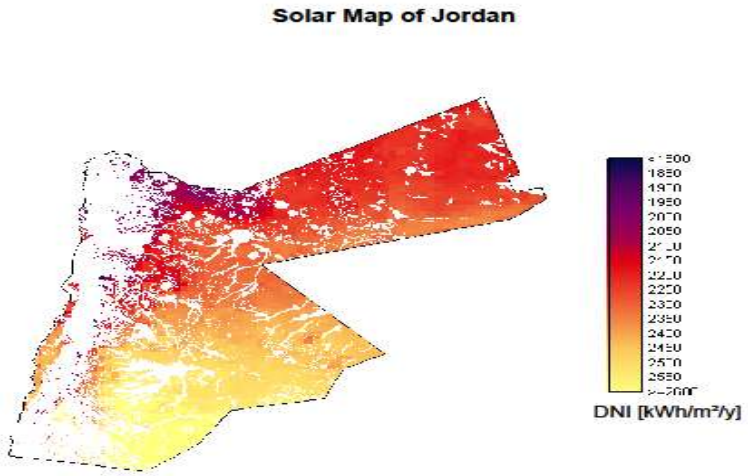
Solar Power generation

For solar power generation : Sun intensity and the number of sunny days dictate the suitability of an area.

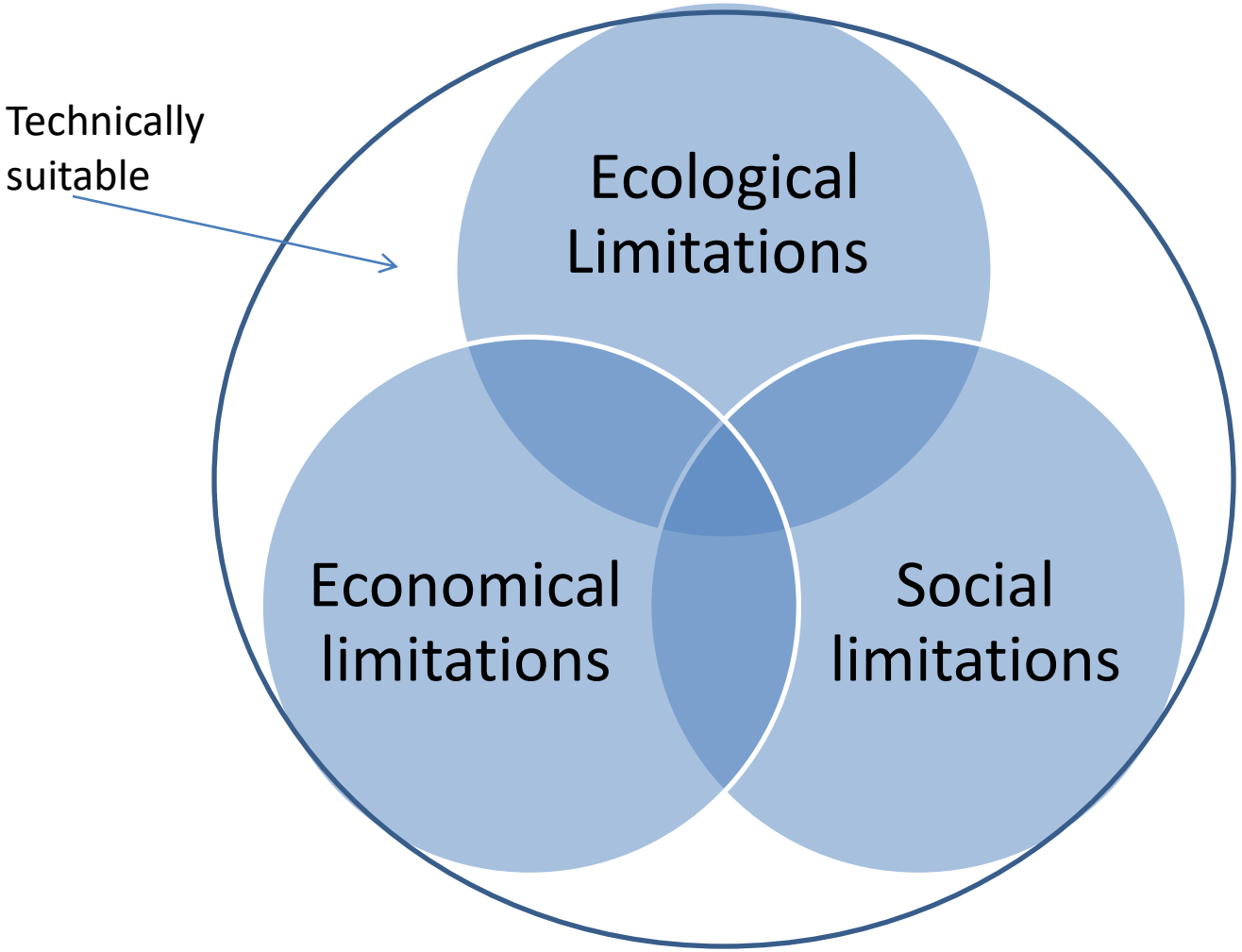
Means of sun intensity readings

Means of sun duration readings

Solar Map: Created from sun intensity map and number of sunny days



Limitations of areas technically suitable for renewable energy



Evaluation according to cost and slope

- Areas that are suitable to renewable energy based on weather data are classified to:

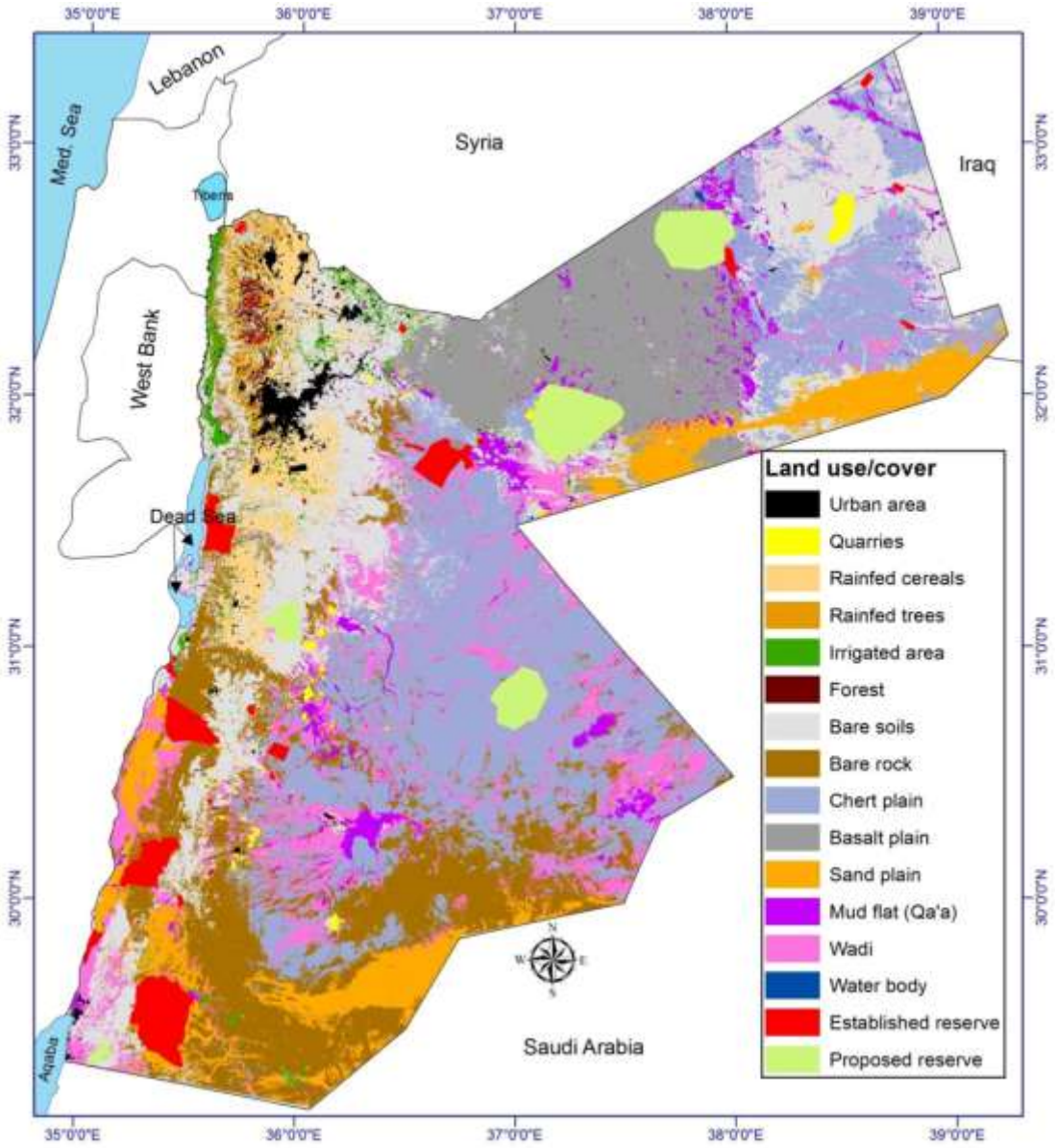
- Highly suitable
- Moderately suitable
- Marginally suitable

According to land use\cover: protected areas road network, urban areas, and slope of land

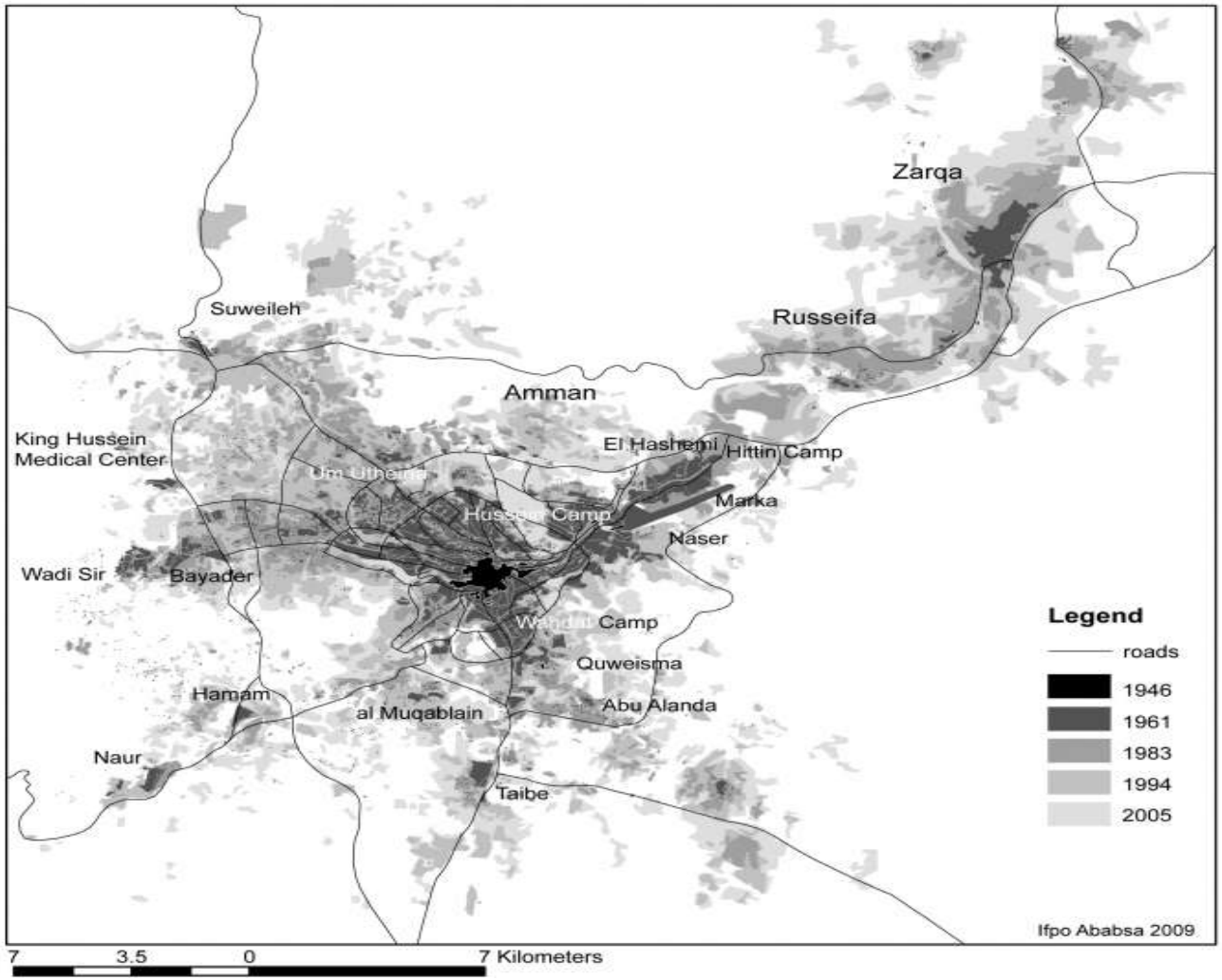
Source of data: Satellite Image: urban, Road, Slope

Road network

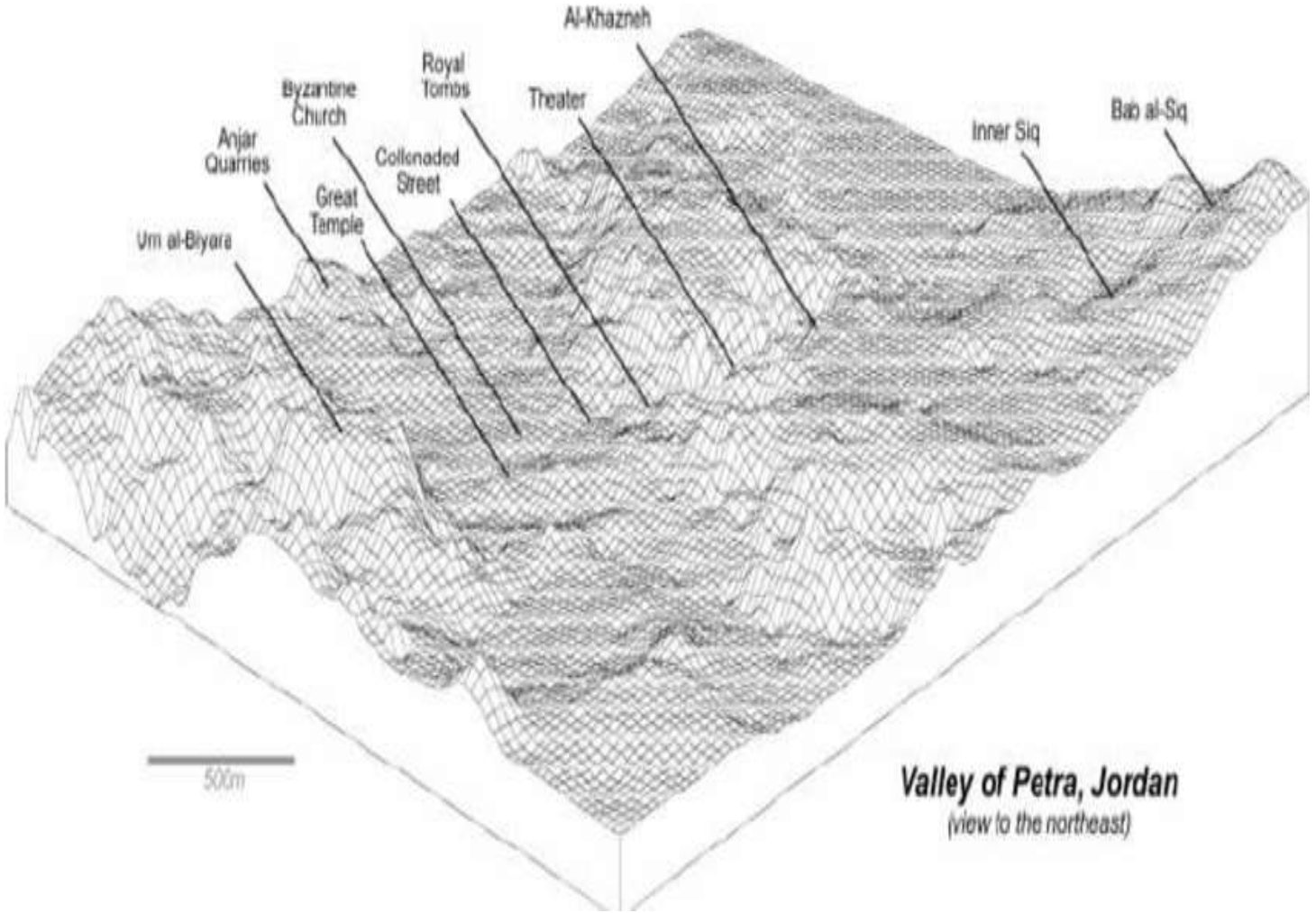
Land use/cover



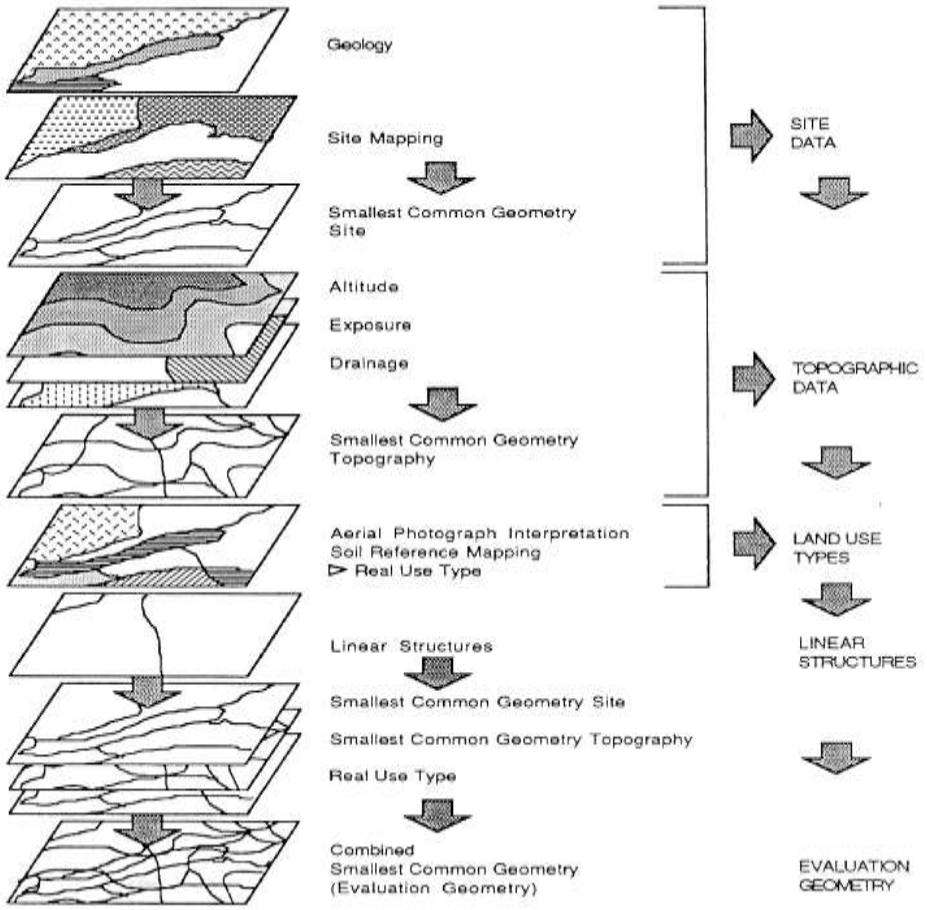
Urban Areas


Zarqa
Suweileh
Russeifa
Amman
King Hussein
Medical Center
El Hashemi
Hittin Camp
Marka
Naser
Wadi Sir
Bayader
Camp
Quweisma
Hamam
al Muqablain
Abu Alanda
Naur
Taibe
Legend
roads
1946
1961
1983
1994
2005
Ifpo Ababsa 2009
7
3.5
0
7 Kilometers

Slope Limitations



GIS overlay process is used to create final land suitability map



Final Land suitability map for wind power generation

The application of this filter allows estimating the available area around **16 %** of the total surface of Jordan. *Taking into account these figures, the wind technical potential is* ***3.6 GW.***