II. Methodology

Prepared by
Land Research Center – LRC

LRC

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For achieving the study objectives, the following steps were undertaken:

1. Literature Review:

Relevant data and information at the local and international levels were collected utilizing the university libraries and internet published material. This is an essential step for highlighting the relevance of land development strategies to attain sustainable development and achieve poverty eradication.

2. Ancillary Tools and Materials Preparation:
The following ancillary tools and materials were prepared for the implementation of the activities in the context of the study:

- Aerial photographs: aerial photographs at a detailed scale (1:5000) were obtained for the purpose of terrain analysis and mapping unit delineation.
- Land use/cover map: land use/ cover map for the WB, which had been produced previously by LRC, was updated to be utilized in this study. This map was prepared using EU CORINE land cover classification (Coordination for Environment) methodology for land use/ cover preparation.
- ArcGIS software: ArcGIS 9.3.1 was utilized for all GIS functions used in the layers (shapefiles) and data analysis.
- Contour lines with 5 m intervals.

3. Study Area Identification:
All the areas classified as non-agricultural in the land use map depending on CORINE methodology were identified. The level and non-steep land surfaces that is comprising a major disqualification of any mechanical land reclamation or hill farming , has resulted in the exclusion of Jericho area, which is mainly encompassing the Ghor area. As a result, the identified non-agricultural area represents 39% of the WB (2195 km^2) as shown in Figure 3. After excluding the areas that are not viable for reclamation (i.e plains, valleys), the size of the non-agricultural area that is suitable for reclamation and will be classified according to its suitability for reclamation is 1,686,094 dunums.

4. Socioeconomic Status Investigation:
The parallel approach in which the socioeconomic survey and analysis proceed concurrently with the physical analysis is adopted in this study. Socio-economic survey for the identified study area population was conducted in cooperation with the MOA directorates. The investigated rural communities were adjacent to the area identified as non-agricultural land. The survey utilized the focus groups approach in addition to distributing a questionnaire to farmers and land owners in the investigated rural communities.

5. Mapping Unit Delineation:
Land form element was selected as the basic mapping unit to fulfill the objectives of the study. The following land form elements were identified and delineated using the on-screen digitizing method:

- Hill Crest – Summit Surface (H)
- Plain (P)
- Valley (V)
- Drainage Depression (D)
- Foot Slope (F)
- Slope (S)

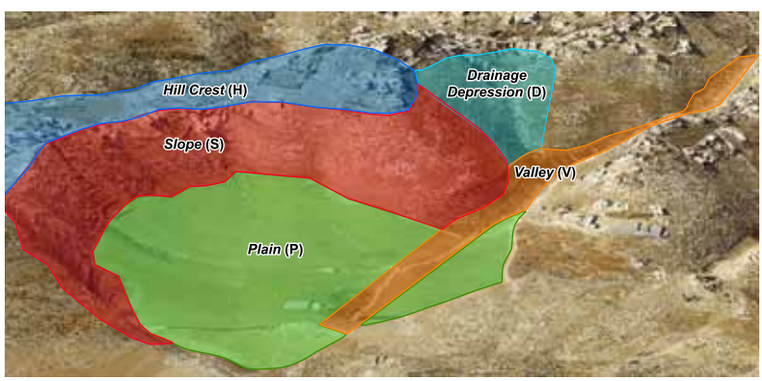

Figure 2: Landform elements sample

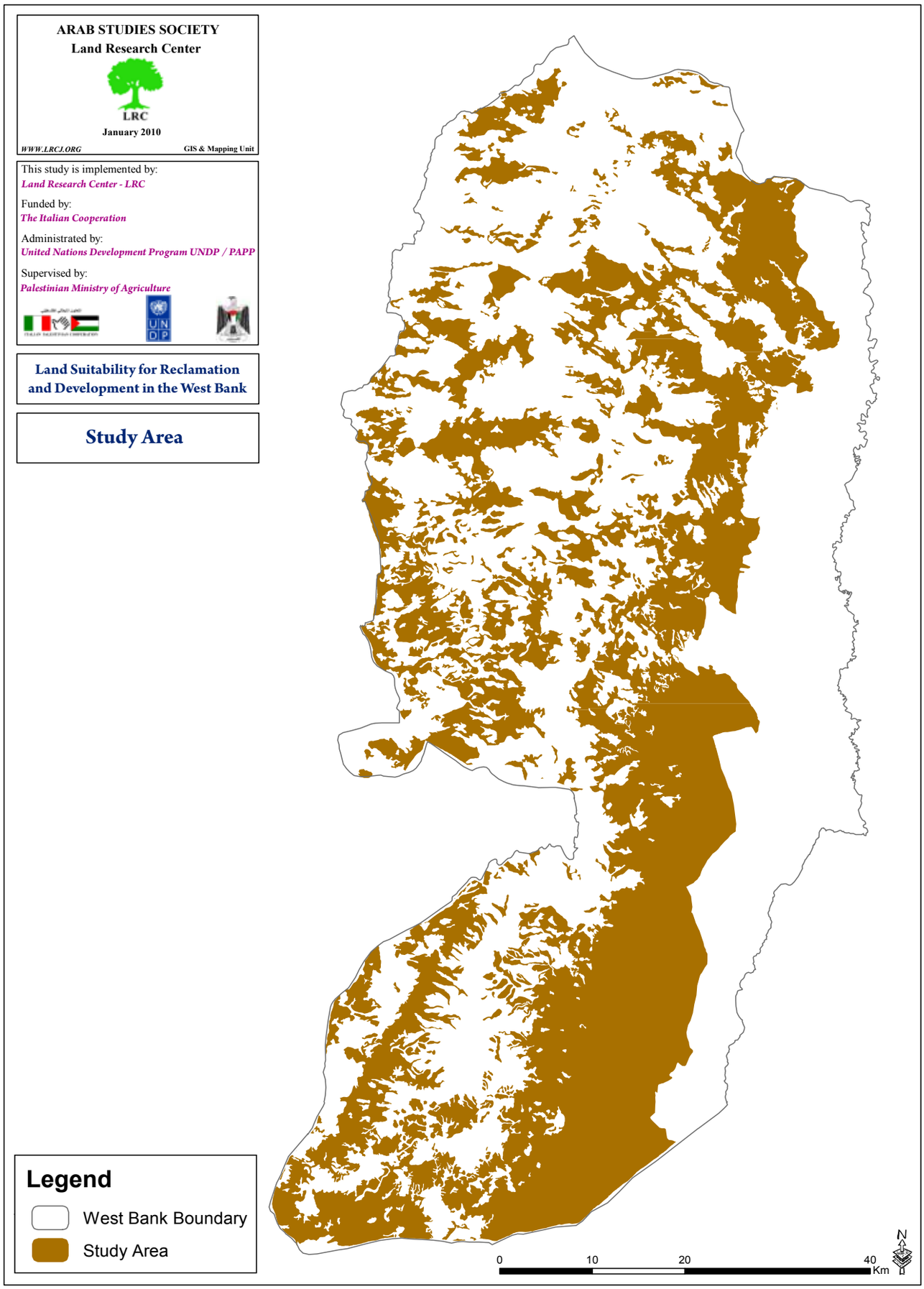

Figure 3: Map of the Study Area

6. Terrain Characteristics Identification:
The following terrain characteristics were identified for each delineated landform elements:

Slope: the following slope classes were identified:

<3% (Plain, Valley , Hill Crest) without any slope S0
3% - 8% S1
8% - 18% S2
18% - 32% S3
>32% S4

Aspect:

Aspect class map derived from DEM data could be grouped according to the requested land form classes depending on the final purpose for using the map. These maps were found to be useful in the higher, more rugged terrain where aspect has an influence on the soil temperature and moisture regimes. The dominant aspect for each land form element was identified as follows:

Table 1: Aspect Class (Degree)

Aspect Class (degree)	Description	Abbreviation
0	Flat	No
0 - 22.5 and 337.5 - 360	North	N
22.5 - 67.5	Northeast	NE
67.5 - 112.5	East	E
112.5 - 157.5	Southeast	SE
157.5 - 202.5	South	S
202.5 - 247.5	Southwest	SW
247.5 - 292.5	West	W
292.5 - 337.5	Northwest	NW

Land Use:

The dominant land use was assigned to each delineated landform element. The following general land use classes were identified in the Study area: Trees = T, Arable = A, Quarries = Q, Urban = U, Colony = C, Non = N.

Rockoutcrop:

The rockoutcrop class was assigned to each delineated landform element based on the percentage of the covered area of the land surface by rocks utilizing the aerial photographs. These classes are as follows:

Table 2: Rockoutcrope Class

Rockoutcrop Class (%)	Status
0	Free
5	Slight
10	Moderately available
20	Available
30	Highly covered
> 40	Rocky area

Climate:

An aridity index utilizing De Martonne approach was assigned to each landform element. The identified classes are: arid, semi-arid and sub-humid.

7. Limiting Factors Matrix Construction:
Since many factors determine the land suitability for reclamation, a matrix for these factors was constructed by giving a weight for each factor. Table 3 displays the components of this matrix.

8 .Identifying Land Suitable for Reclamation:
According to the above mentioned matrix, each polygon has been assigned a value classifying its suitability for reclamation. The suitable land for reclamation should possess the following criteria:

- Slope should be less than 32% (excluding plains and valleys).
- Rockoutcrop should be less than 40%.
- Rainfall should be more than 300 ml/year.

After considering these factors the area classified as suitable for reclamation is about 467 km^2 (467,000 dunums).

Table 3: Weights of factors determining land suitability for reclamation

Class 5%				**Slope 20%**				**Rock outcrop 25%**				**Aspect 5%**				**Socio-economic 15%**				**Climate 30%**		
S	F	H	D	S0	S1	S2	S3	10=>	10-20	20-30	30-40	NW , W	SW , S	NE , N ,No	SE , E	Excellent	Very Good	Good	Fair	Arid	Semi Arid	Sub Humid
1	3	4	5	5	15	20	10	10	25	15	5	5	4	3	2	15	12	8	4	15	30	20
Min		Max		Min		Max		Min		Max		Min		Max		Min		Max		Min		Max
1		5		5		20		5		25		2		5		4		15		15		30

According to table 3, the land suitability for reclamation classified as follows:

Most suitable : 81% - 100%
Highly suitable : 61% - 80%
Moderately suitable : 41% - 60%
Least suitable : 32% - 40%

9. Identifying Land Suitable for Forests and Rangelands:
The remaining area is the land that would be classified as suitable for forest and rangeland use which has an area of 1,189,089 dunums. The land suitable for forests is assigned according to the following criteria (the existence of each of the following conditions is a killing factor for land reclamation):

- Slope is >32%.
- Rockoucrop is >40% in areas where rainfall is >300 ml/year.
- Rockoutcrop is <40% in areas where rainfall is <300 ml/year.

The area for the land suitable for forest is found to be 378,381 dunums.

The land suitable for rangeland is assigned the following criteria:

- Slope is less than 32%.
- Rockoucrop is >40% in the areas where rainfall is >300 ml/year.
- Rockoutcrop is <40% in the areas where rainfall is <300 ml/year.

The area for the land suitable for rangeland is found to be 810,708 dunums.

10. Applying the above mentioned results at the Governorate level.

11. Preparation of the land suitability maps for reclamation, forests and rangelands uses.

12. Preparation of the final reports with maps included in the report.

Figure 4: The consultancy team categorizing reclamation-able land