

# LAND USE PLANNING USING GEOGRAPHICAL INFORMATION SYSTEM (GIS) TECHNIQUES

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## □ INTRODUCTION

Watersheds are characterized by their high degree of diversity and they are considered as basic unit for sustainable development.

Sustainable watershed management is crucial to minimize land and water quality degradation and ensuring the resources optimal use.

The main goal of sustainable development is improving public welfare and preserving the environment for next generations.

## □ INTRODUCTION

- Resources allocation especially about those which are limited is very sensitive process.
- One of such limited resources is land for various utilities.
- Land use planning is a process based on socio-economic needs and spatial analysis of elements such as topographic shapes, vegetation characteristics, soil and water resources.

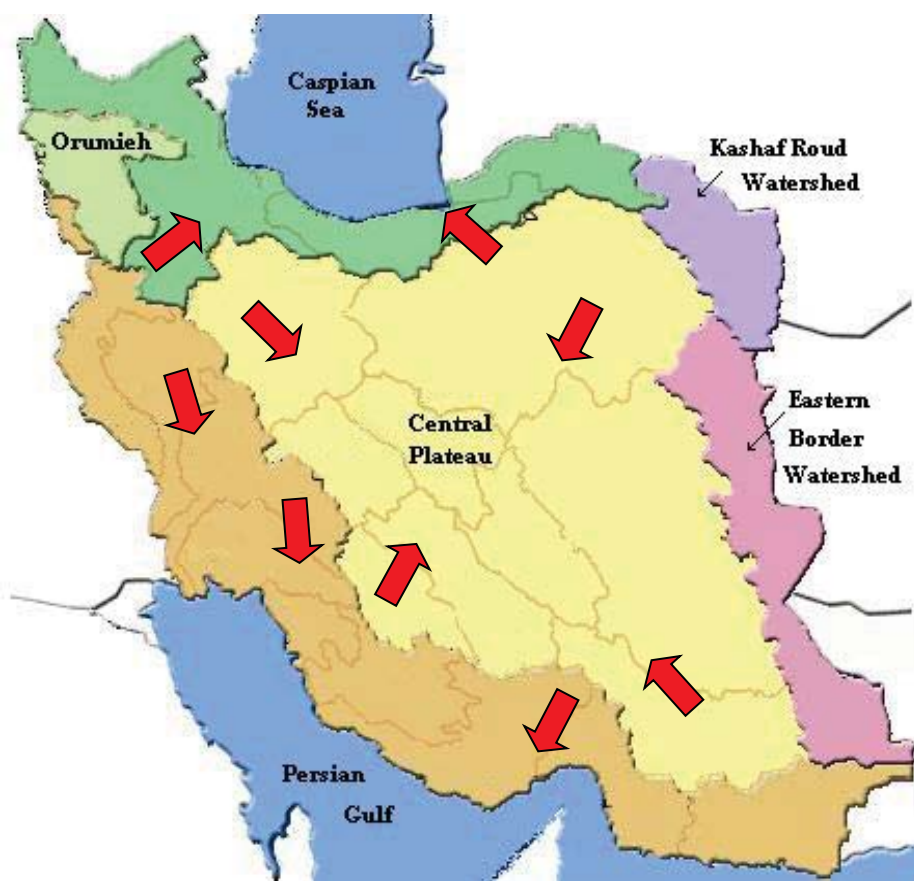
## □ OBJECTIVE

- In this study, a land use plan has been developed using GIS in order to use the resources optimally in Kalaleh & Darana watershed located in northwest of Iran.

## □ land & agriculture in Iran

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- Total land area of the country : 165 Mha
  - Cultivable area : 37 Mha
  - Actual cultivated area : 19 Mha
  - Forests area: 12.4 Mha
  - Pastures, mountains and deserts area: 89.2 Mha
  - Irrigated area: 8 Mha
  - Rainfed area: 6 Mha
  - fallow land area: 4.5 Mha

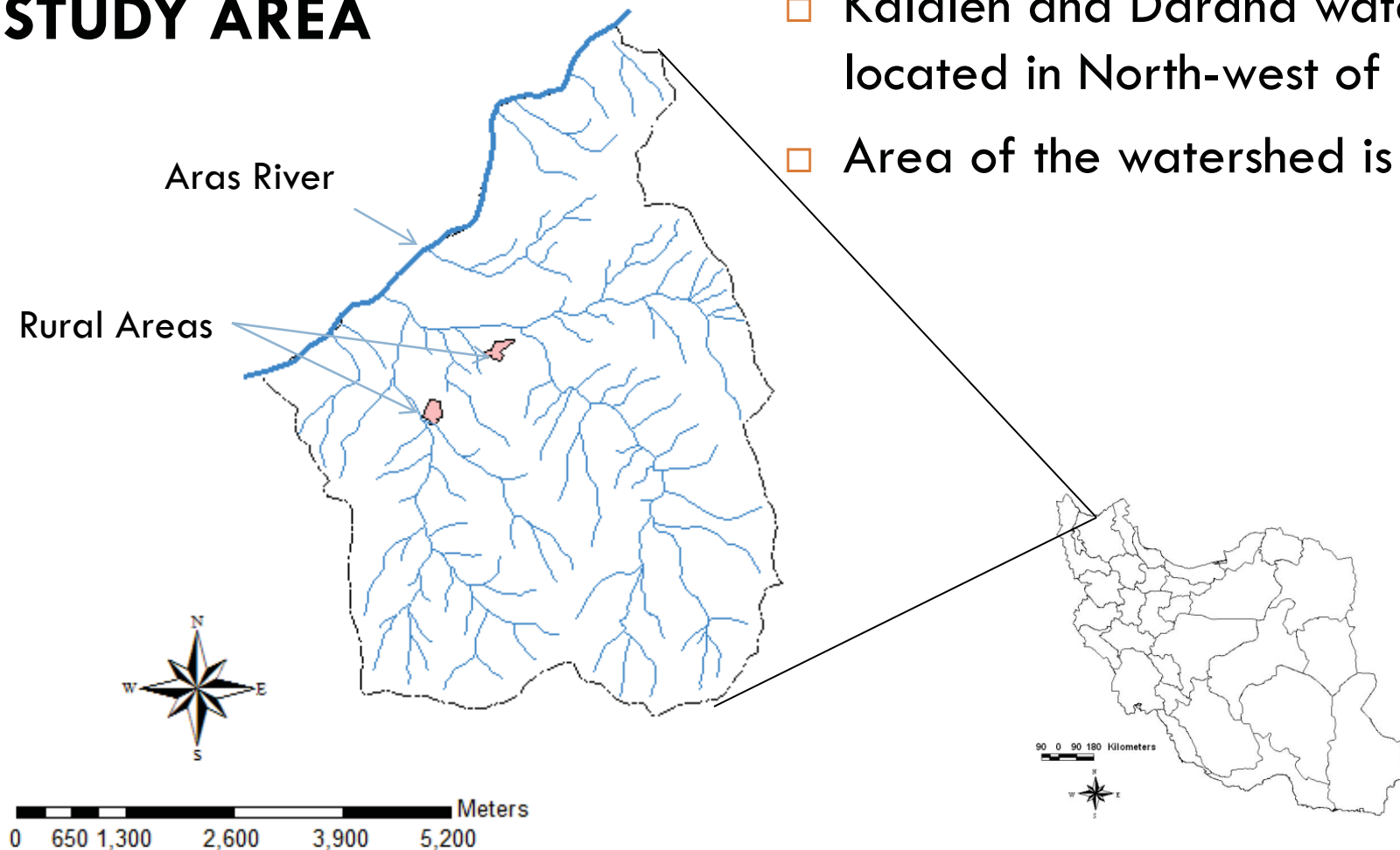
## main watersheds in Iran



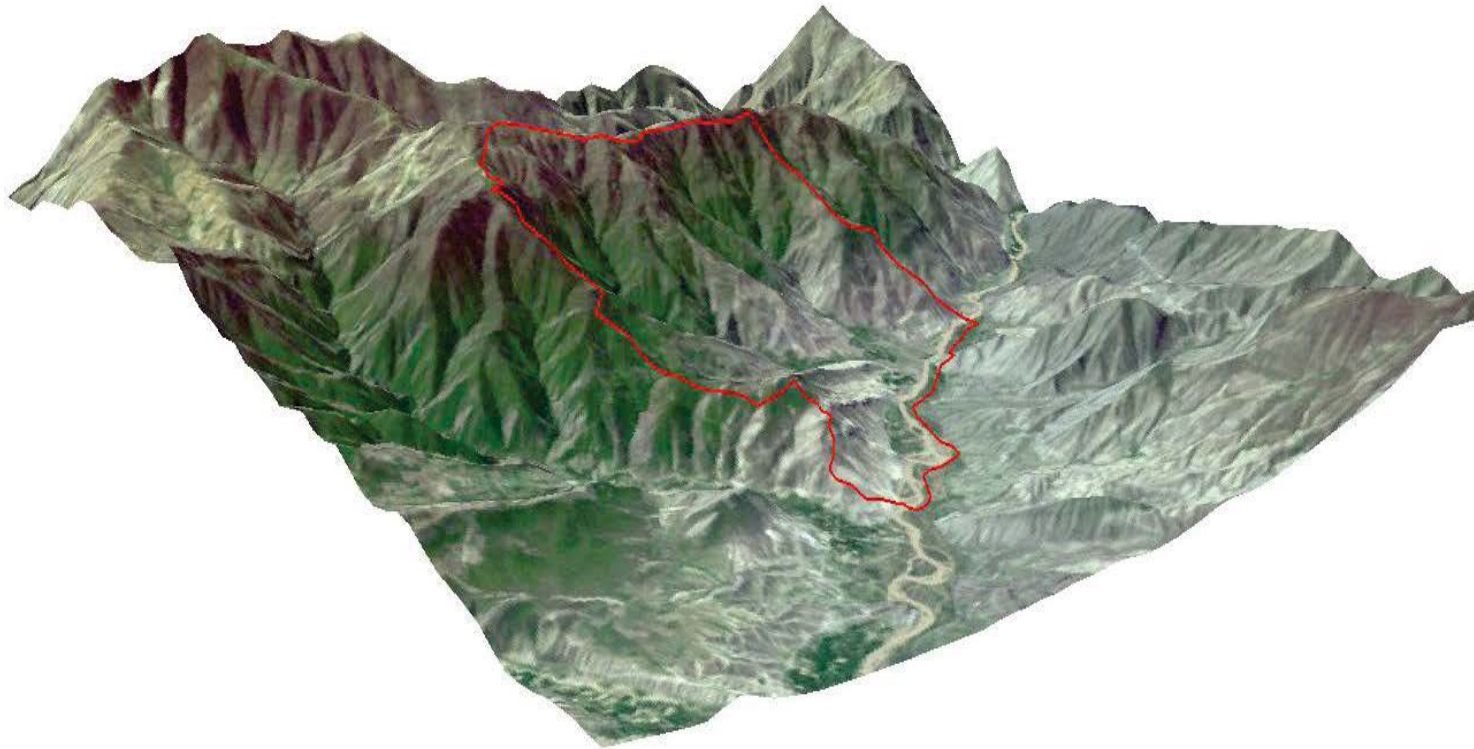
Basin	Area ( $\times 10^3$ Sq.Km)	Rainfall (km <sup>3</sup> / year)	% of total rainfall
Central Plateau	831	138	32
Persian Gulf and Oman sea	430	162	38
Caspian Sea	177	83	19.5
Hamoun Lake	106	12	3
Orumieh Lake	53	19	5
Sarakhs	44	11	2.5
Total	1641	425	100

## STUDY AREA

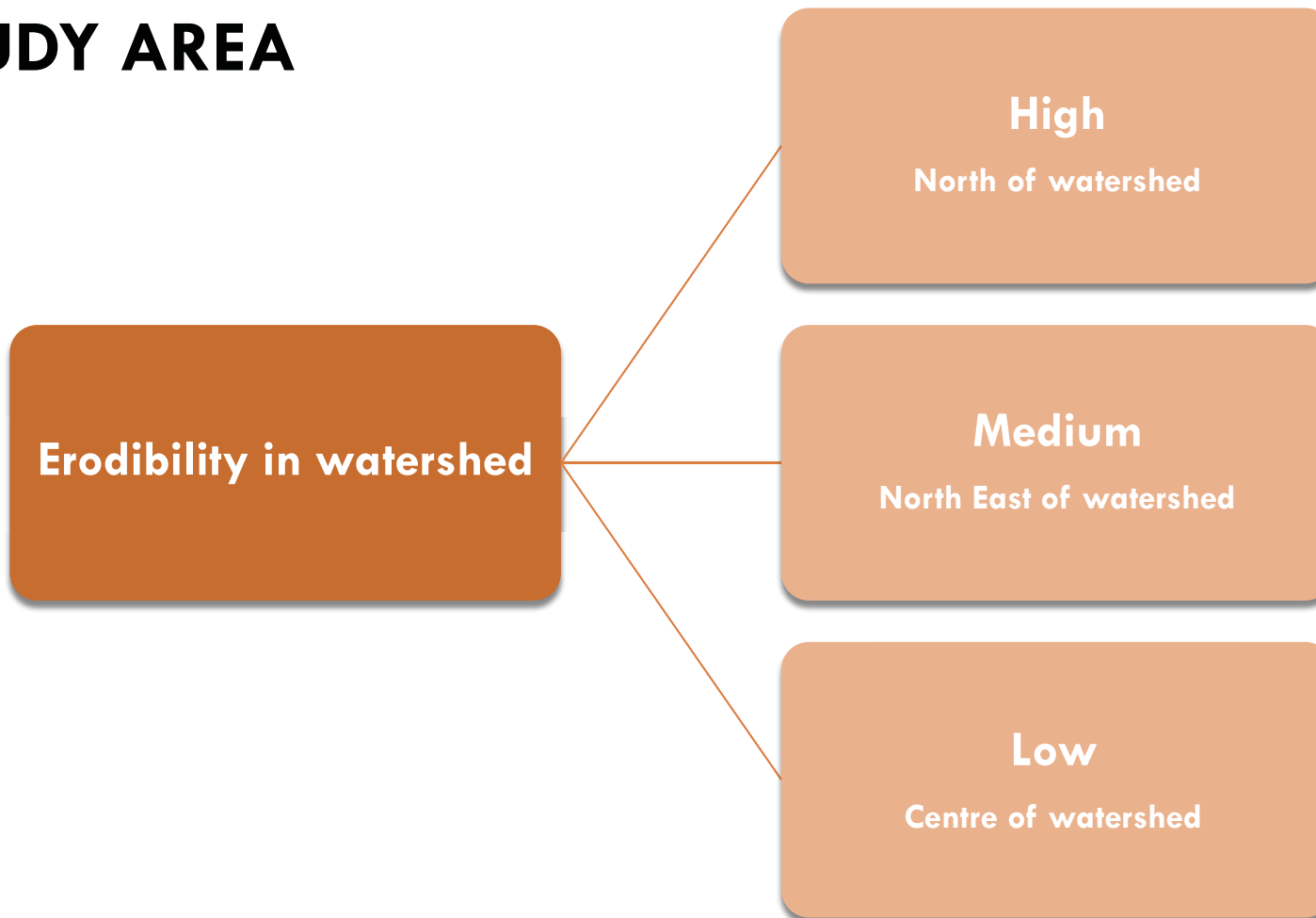
- Kalaleh and Darana watershed located in North-west of Iran.
- Area of the watershed is 31km<sup>2</sup>



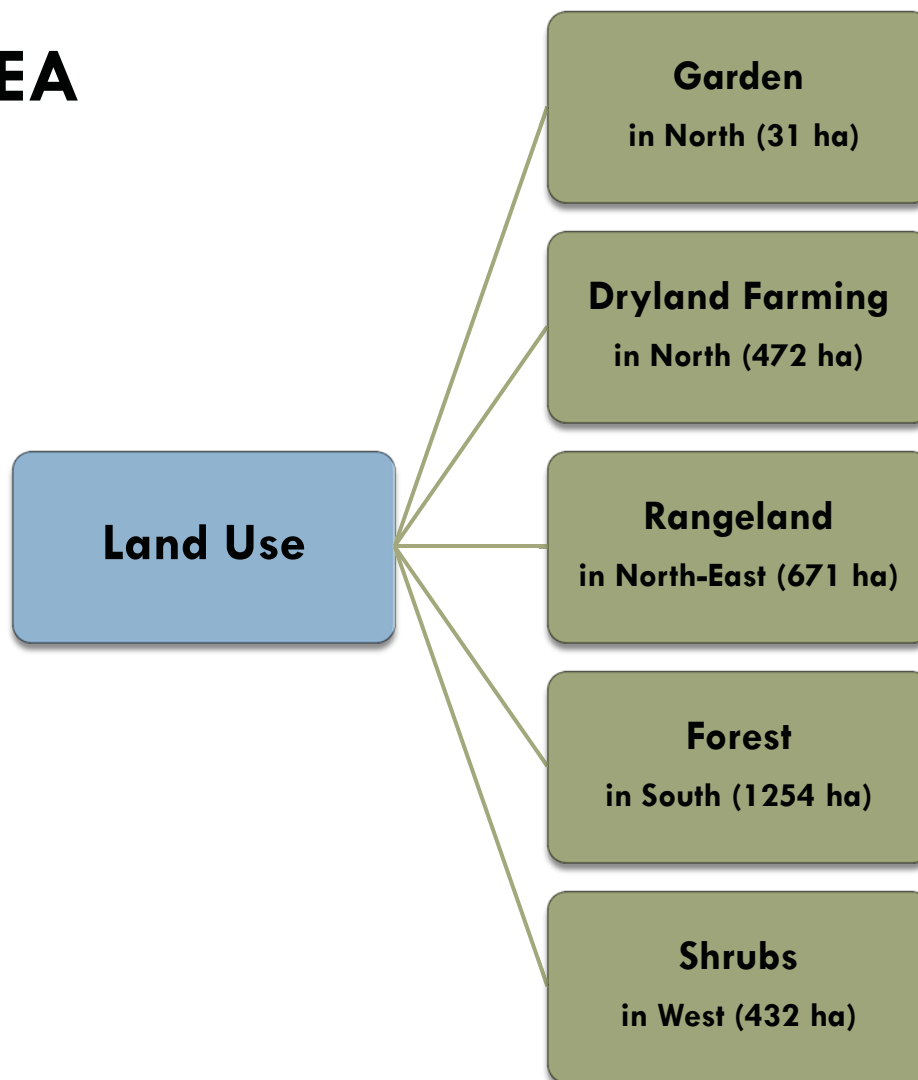
## □ STUDY AREA (3D VIEW)



## □ STUDY AREA



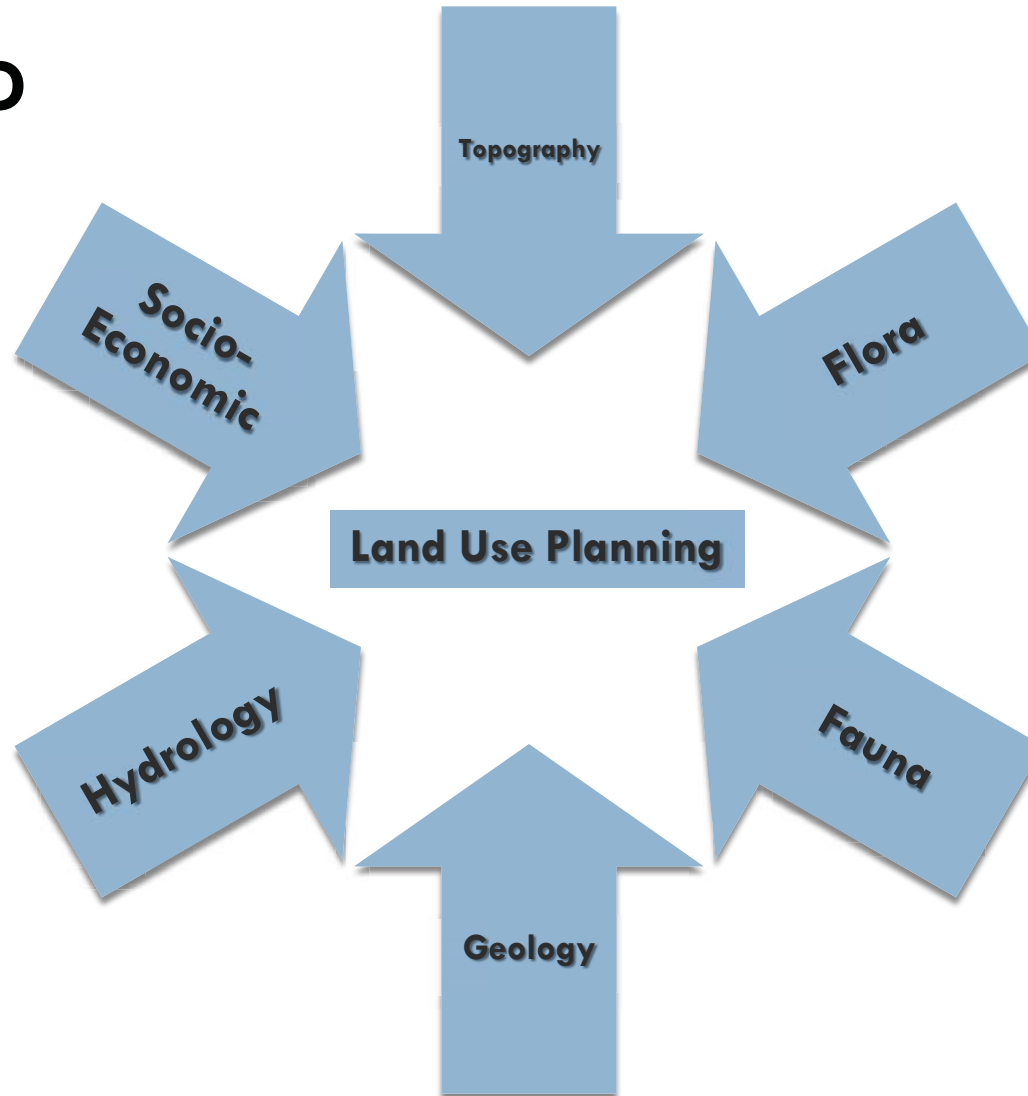
## □ STUDY AREA



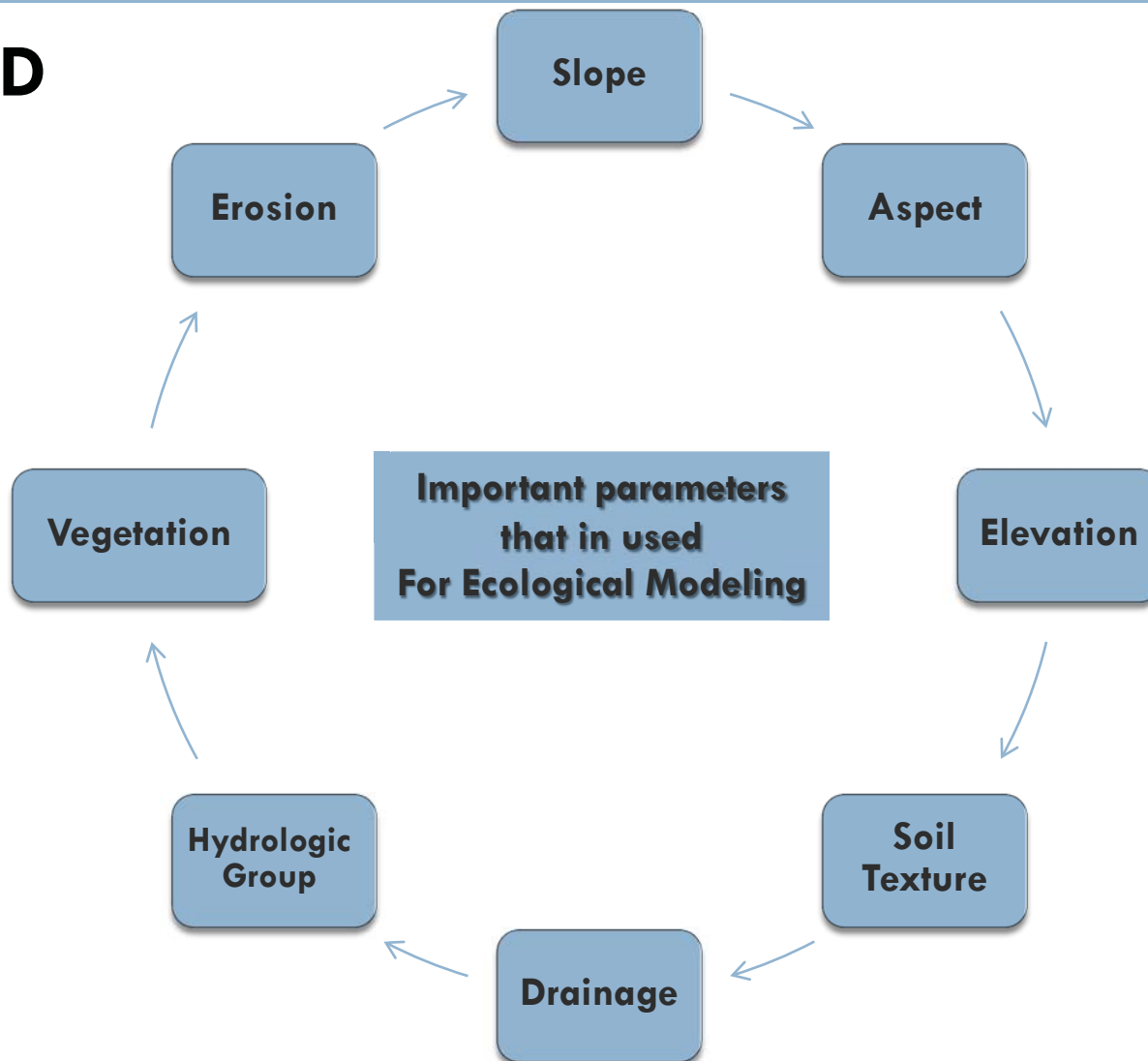
## □ **METHOD**

- The geographic information system functions were used for land use planning.
- The main parameters that were used in GIS functions for evaluation are some of the features that have the main role in land use such as topographic, weather and climatic, geologic, hydrologic, socio-economic, pedologic, vegetation and erosivity features.

## □ METHOD



## □ METHOD



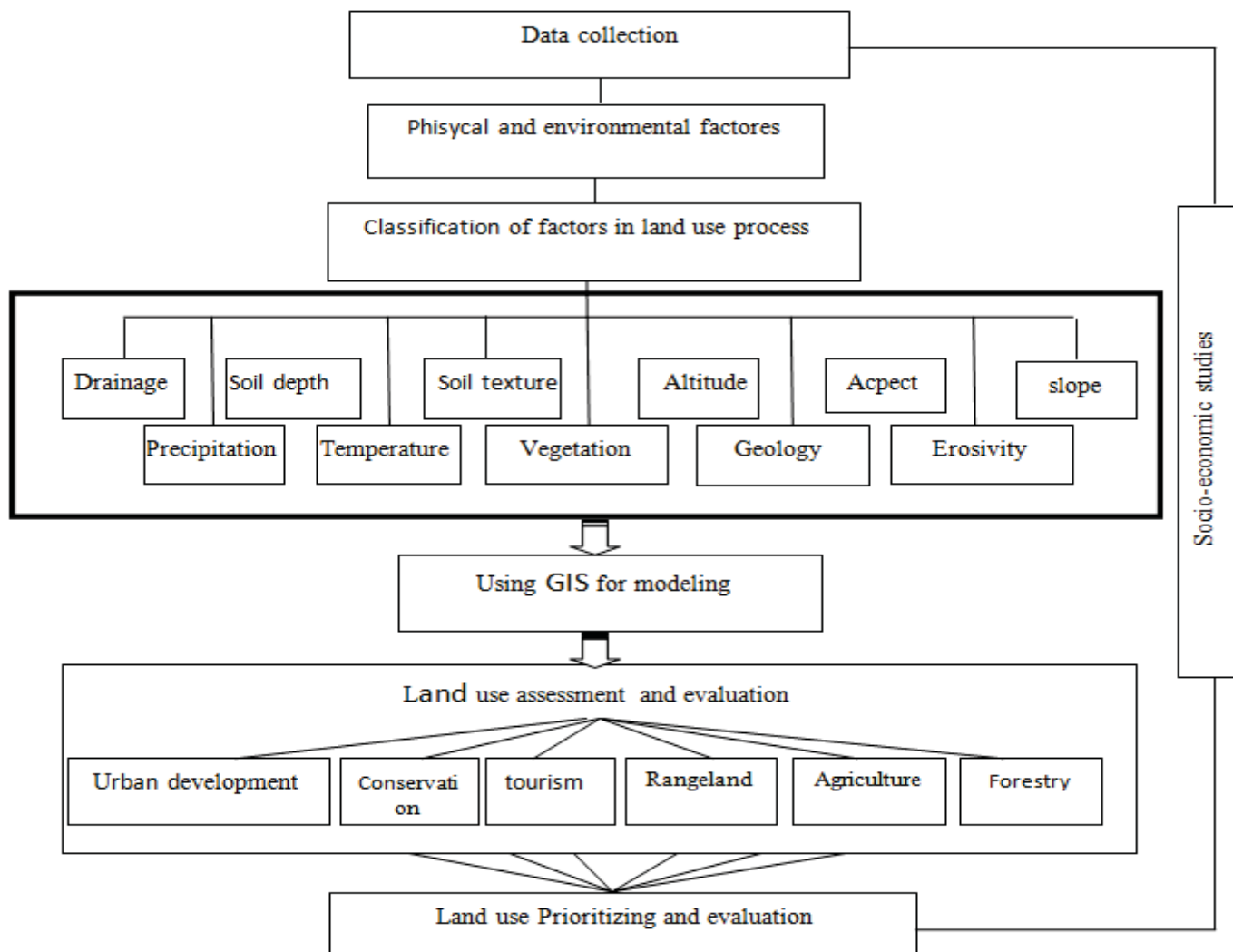
## Main Steps of Study

The main steps are as follows:

- Identify land use goals
- Identify the factors necessary to achieve the desired goal
- Prioritize based on objective factors
- Ecological assessment

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# RESULTS

## □ Forestry suitability

This model contains 3 classes of land use suitability:

- In class 1 there is no limit to the growth of commercial forests
- In class 2 there are very few limits to the growth of commercial forest land
- In class 3 land constraints for growth of commercial forest are relatively modest.

## Criteria of Forestry Suitability

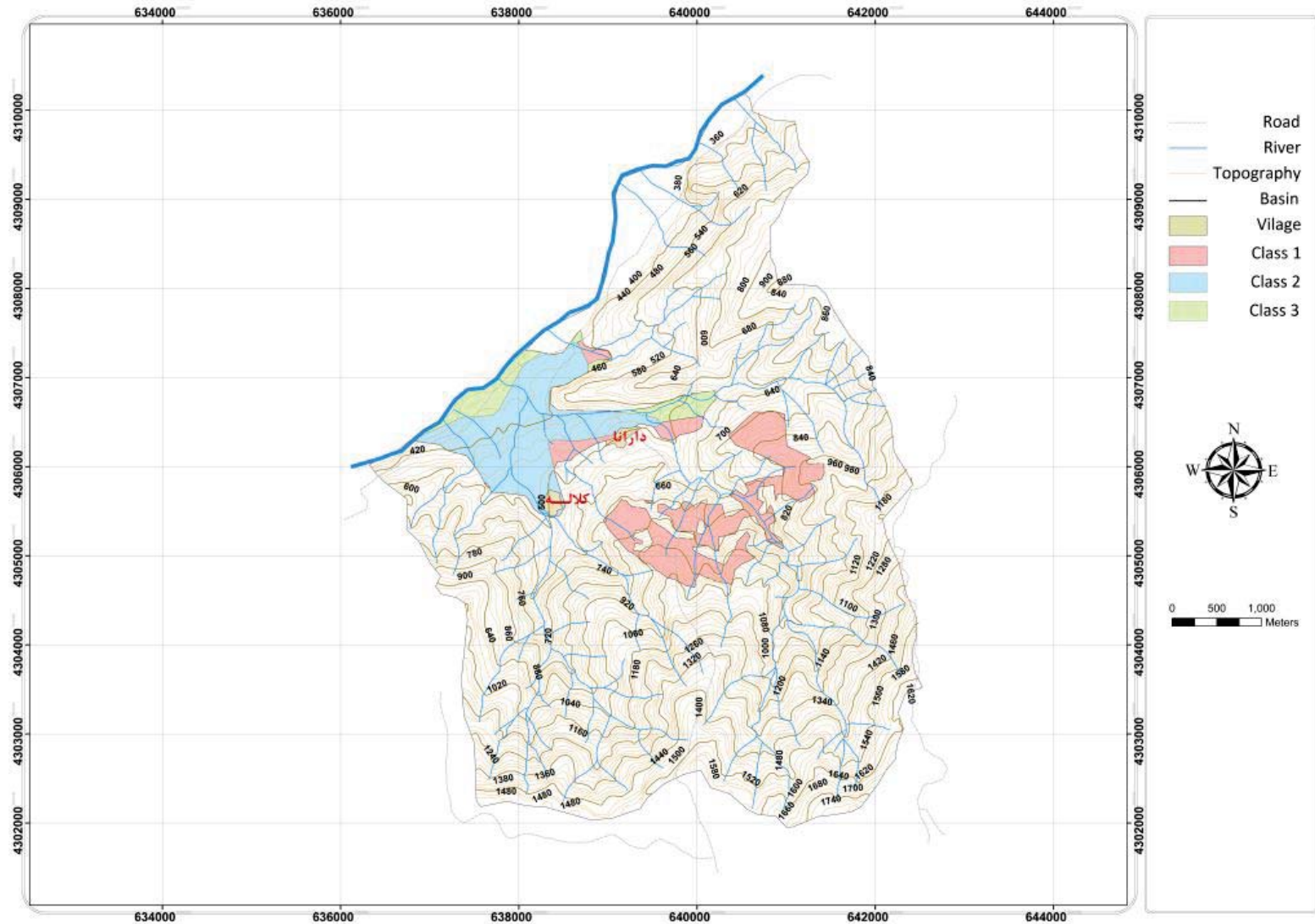
	Altitude (m)	Slope%	Soil texture	Drainage	Soil depth	Bed rock
Class 1	0-1000	0-25	clay	Avg.	deep	<b>limestone</b>
Class 2	0-1000	0-35%	loam	Avg.	deep	<b>limestone</b>
Class 3	0-1400	0-45%	loam	incomplete	Avg.	<b>limestone</b>

## Result of Forestry Suitability

Class of Forestry suitability	Area (km <sup>2</sup> )
Class 1	1.7
Class 2	1.7
Class 3	0.48

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## □ Agriculture and rangeland suitability

This model contains 5 classes of land use suitability

- class 3 is suitable for growing agricultural products, but it is not suitable for continuous harvest
- class 4 is highly suitable for range and moderately suitable for dry farming of fruit trees
- class 5 is moderately suitable for range and dry farming
- class 6 is suitable for beekeeping and orchard on terraces
- class 7 is not suitable for range and agriculture

## Criteria of Agriculture and Rangeland Suitability

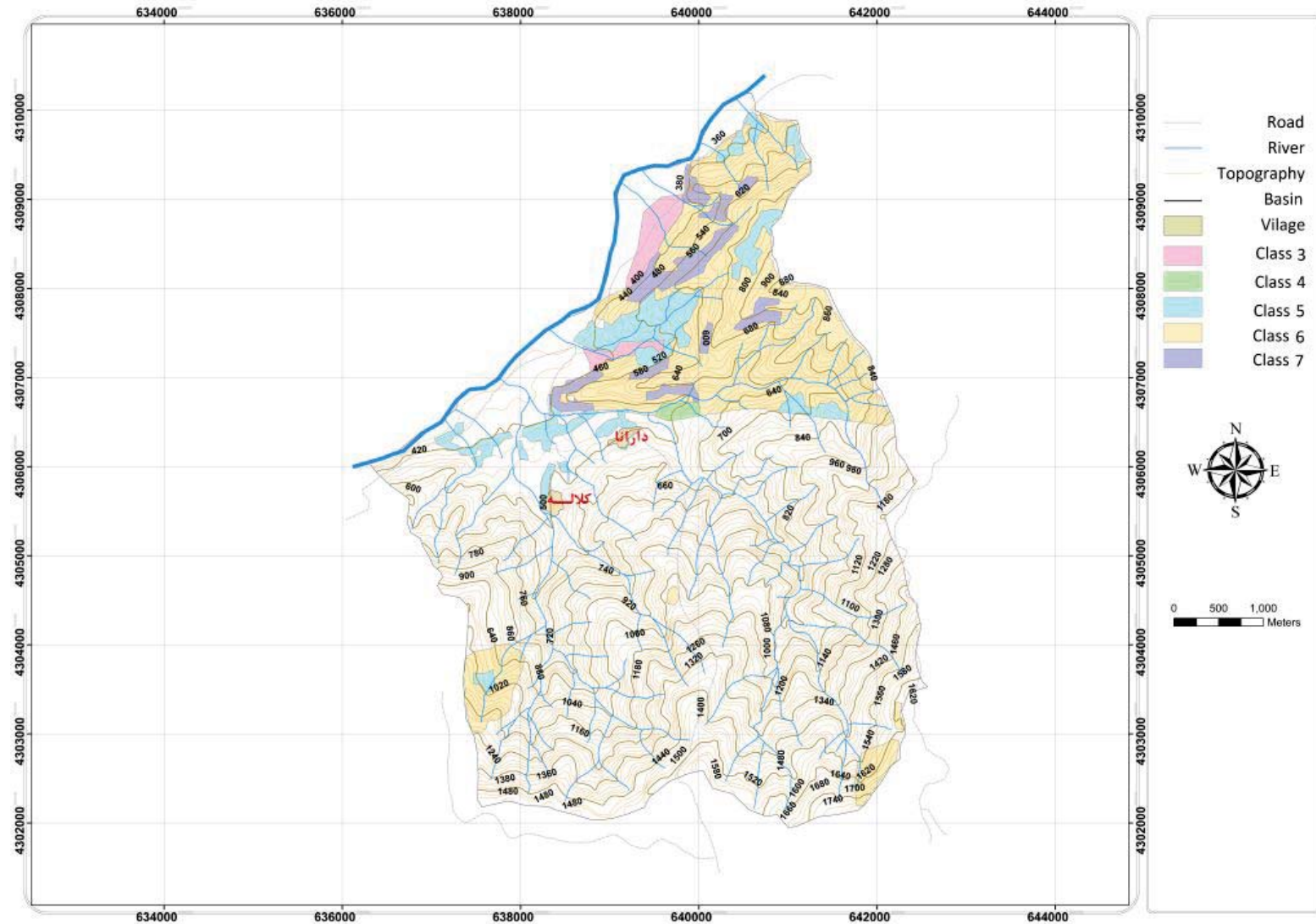
	Slope %	Soil texture	drainage	Soil depth	Erosivity
Class 3	0-8	Loam/clay	Avg.	Avg.	Avg.
Class 4	8-15	Clay	Avg. to Better	Avg.	Avg.
Class 5	8-15	Clay/Loam	incomplete	Low to Avg.	Avg. to high
Class 6	15-30	Sandy loam	Incomplete	Low to Avg.	Avg. to high
Class 7	>30	-	-	-	Avg. to high

## Result of Agriculture and Rangeland Suitability

Class of Agriculture and rangeland suitability	Area (km <sup>2</sup> )
Class 3	0.38
Class 4	0.08
Class 5	1.44
Class 6	5.36
Class 7	0.78

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# CONCLUSION

due to the mountainous condition, a large percentage of the watershed area has topographic constraints such as steep slope and high elevation.

Since due to improper management in the past, vegetation cover of the area has severely decreased which often cause sever soil erosion and flash floods, in land use planning the priority should be restoration of the watershed by revegetation.

Short-term plans in the watershed should focus mainly to avoid degradation of pastures and forests.

Mid-term programs should consider the expansion of forests.

In long-term plans, main point should be improving public participation in natural resources conservation.

A scenic view of a river flowing through a lush green forest. The river is the central focus, with white water rapids and a rocky bank on the right. The left bank is covered in tall grass and a dense forest of tall, thin trees. In the background, a steep, rocky hillside rises above the trees. The overall scene is peaceful and natural.

**Thanks For Your Attention**