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Evaluation of the suitability of land components for Land use in Mohsenab, Iran

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ABSTRACT

Land suitability is the fitness of a given type of land for a defined use. The process of land suitability classification is the appraisal and grouping of specific areas of land in terms of their suitability for defined uses. The development and creation of appropriate points for this land use without considering environmental capability will result in the appearance of several ecological, economic, and social problems This research was conducted to investigate land suitability classification for better use of lands using geographic information system in Mohsenab region, Ilam province, Iran. Soil units were delineated bases on aerial photo interpretation, using topographic maps as auxiliary materials. Land suitability classification was done based on information extracted from soil map, using guidelines given in FAO. The land suitability as ability of land ability for forests, rangeland, dry and irrigated cultivation was determined. Finally, the appropriateness of land units components were prioritized in the current situation and the future for different applications. The results showed that some restrictions including low and irregular rainfall, the lack of surface water suitable, shallow soil, imbalance of nutrients such as phosphorus and organic matter heterogeneous are the main problems in the study.

Introduction

Historical events have shown that proper and effective use of land and water resources of the most important and basic materials, prosperity and happiness of the inhabitants of each country. Great civilizations in the plains and fertile low lands and water and endangered species and many of the mnaughtas a result of disproportion at utilization of resources. Today, there are more problems in agriculture and natural resources and its negative consequences in all areas of economic and social life was threatened due to lack of attention to the land capability and thus damaging to their unfit use.

Problems such as flooding, soil erosion, landslides, destruction of forests and rangelands, desertification, lack of economic and agricultural production, reduction of soil fertility, migration issues, notably the underground aquifer, salt water, drying up streams and fields, environmental pollution, disturbing the balance of natural ecosystems, and of other difficulties, all directly or indirectly as a result of lack of attention to land capability and unfit use of them (14).

Prevent the destruction of the soil and its protection is one of the most important duties and responsibilities which the present generation to next generations, and this only possible by proper planning and utilization of land resources. Utilization of land should be based on talent and its propriety for various applications in order to achieve maximum efficiency in addition to the generation capacity of the land to be preserved for future use. Conversion of fertile agricultural land to residential, industrial, etc. can be caused by lack of planning and policy making in the some of country (11).

Sustainable agriculture can only be based on the suitability of land for different types of uses that would be classified and then exploited.

The agriculture is limited due to rapid population growth, and urbanization, it should be the best use of the land (4).

The demand for food will be increasing because increase the population of Iran more than one million people every year, and the unfair distribution of food and improvement of economic conditions that will increase the per capita consumption, Thus preservation of the quality and quantity of food production resources, especially soil and water, is very important. Evidence suggests, water and soil safekeeping prevalent from centuries ago in primitive human societies are quite popular, but its spread in this century, especially in the last forty to fifty years.

Today, however, the most developed countries have been able to solve problems of soil and water conservation, but developing countries are still in the early stages, should be increase public awareness, in this countries and agriculture is more mechanized. Soil conservation methods must be Should be coordinated and shared with the cooperation of the people, up to best use from water and soil according to the scientific methods (20).

Unfortunately, in Iran transfer of land capability and assessment before any land use is not significant; this neglect

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has caused thousands of hectares of the country today outside the ability and talent to use. Thousands of hectares of fertile land of this country used for urban and industrial development. Due to population growth and the problem of food shortages in the future, will be one of the important challenges. In front of thousands of hectares of land suitable for urban or industrial centers, has been planted which results in the destruction of natural resources and reducing its yield. Thousands of hectares of pastures and forests where production, meat, forage herbs are considered to have been brought under cultivation, resulting in the destruction of grasslands and losses in the agricultural. Due to the neglect to land susceptibility, thousands of hectares of hilly terrain land Have been planted to dry land, resulting in soil erosion and flooding and filling the reservoir of sediment (21). It should be noted that various applications and the management of land has important effects on soils (4).

Thus the land has different capabilities and talents, recognizing of this capability importance, the type ofland usein accordance with their capabilities more important (14).

Thus, by choosing the land to the best and most profitable use for maximum productivity, the land remains protected for future generations (7).

In assessing the land two important aspects is investigate:1- physical aspects of the soil (terrain andclimate); 2.Social aspects-economic.

Breda et al. (2004),investigated the proportion of land area Raml recurrence in Tunisia for crops including wheat, barley, sorghum, potatoes, beans, onions, watermelons and tomatoes in dryland and irrigated,and determine the limiting factors were identified.

Examples of this include studies in various regions of Iran including Gilanand Mazandaran (12), Golestan province (13).

Materials and method

The study area

The study area (Mohsenab watershed) is3511.5 Hectares in size located in Mehran city, Ilam province, and west of Iran. The geographic location is located.between 46° 21′ 21″ to 46° 28′ 18″ East longitude and 33° 7′ 47″ north latitude and 33° 10′ 34″

Basic shapes like rectangles, which is the major side length of 10.8 km East-West and North-South for 5.2 kilometers in length and its small side. Mohsenab watershed in the country's geographical location and Ilam in Figure 1can be seen. Land use map of the study area is shown in Figure 2.

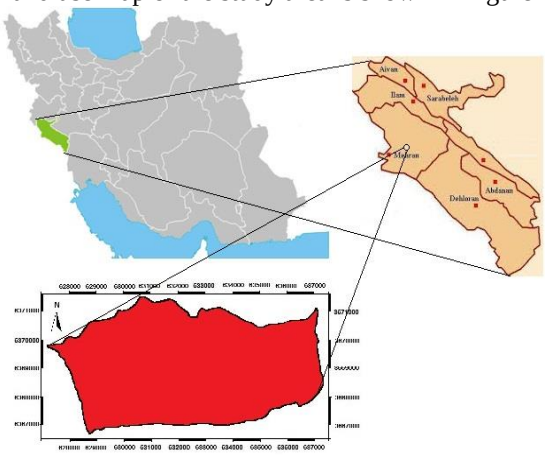

Figure 1. Location of Mohsenabasin the country and Ilam

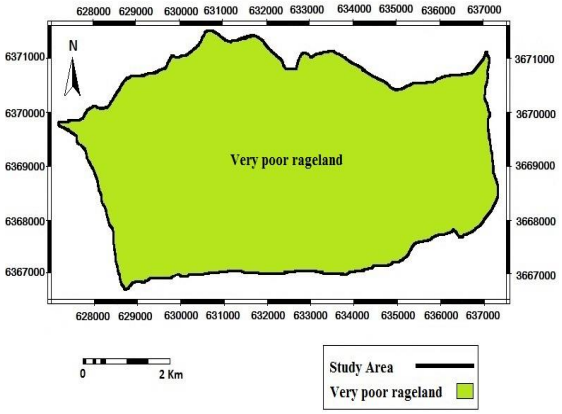

Figure 2. Land use in casestudy area

Methodology

In this study, soil map units are considered as land units, For this reason, land suitability evaluation studies was used on soil science studies in 2011 by the consulting engineers Sabz Andizhan Kabirkoh(SAK) That was in the fall of 2011. Separation of brigades, units and land components (of the map) was performed according to standard methods physiographic. Separation of land resources (types, units and components) were made by the first interpretation of aerial photographs and determine the boundaries of each.

Attention to fundamental differences in the structure of each of the main types of physiographic, each of the main types of land into smaller plots of land classified.

Land units are also due to differences in soil and climate of the earth have been divided into smaller parts as components of land. After determining the boundaries of land resources field studies were conducted on the map which uses physical characteristics of soils and complete information from the laboratory results Soil classification as determined by large groups and subgroups of soil and soil family was done by USDA.

Results and discussion

Types of land in the area

Land topography watershed study area Mohsenab manner that only one type of land in seen as a type of Plateauxe Upper Trraces.

Table 1. Soil classification study area Mohsenab

land componen	Area (percent)	USDA soil taxonomy 1975 edition 2006		
		Family	Sub group	Order
3-1-1	29.5	Loamy, mixed, calcareous, hyperthermic	Typical Torrifluvents	Entisols
3-1-2	35.8	Loamy, mixed, calcareous, hyperthermic	Typical Torrifluvents	Entisols
3-1-3	22.1	Fine-Loamy, Skeletal, mixed, hyperthermic	Typical Torrifluvents	Entisols
3-2-1	12.6	Fine-Loamy, mixed, hyperthermic	Typical Torrifluvents	Entisols

3.1.1. Profile element types of lands, territories entity's control profiles Map of entity Mohsenab watershed land in the study area (4) is provided.

Table 2. Soil hydrological groups of components of land

Soil hydrological groups	land components
C	3-1-1
C	3-1-2
D	3-1-3
D	3-2-1

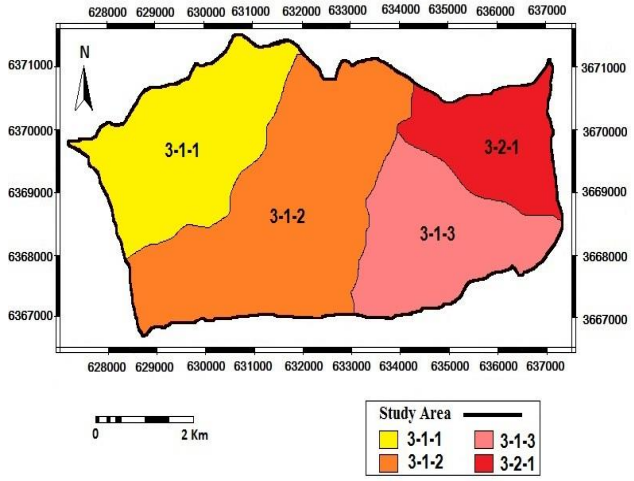

Figure 3. Components of watershed land use map

Soil hydrological groups

Investaging the soil hydrological groups are important to estimate runoff from rainfall. Accordingly, hydrological groups study area Mohsenab is comprised of two groups: C and D in Figure 4 and Table2, hydrological group land is given for each entity.

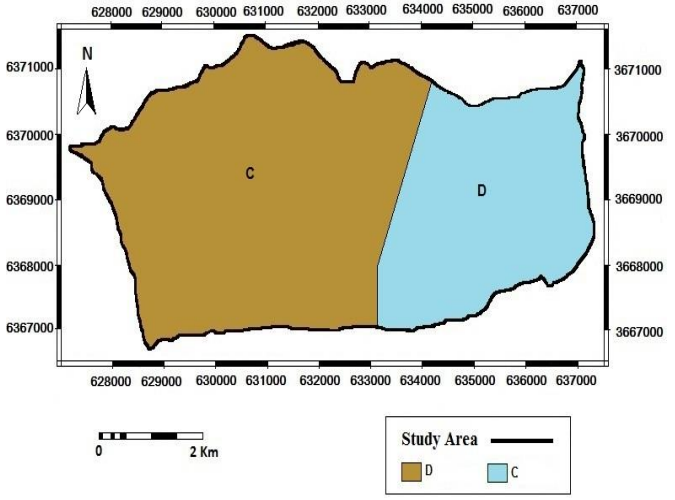

Figure 4. Soil hydrological groups of Mohsenab watershed

Table 3. The proportion of components of land for irrigated agriculture in the current situation

Under grade of Land proportion	Intensity of limitation	Basic limitations	land components
N_1eg	drastic	spall ، erosion	3-1-1
N_1eg	drastic	spall ، erosion	3-1-2
N_1eg	drastic	spall ، erosion	3-1-3
N_1eg	drastic	spall ، erosion	3-2-1

Land proportion

The following tables are considered land suitability for different uses and for the present and the future (after the land reform).The division of land suitability for irrigated agriculture and water resources and water supply facilities are not considered, and classification of land suitability has been providing water supply, if the water is not available for components intended for irrigated agriculture, Such land must be devoted to dry land farming.

The proportion of land units components for various applications in current and future, are observed in a series of tables 3 to 10 and its maps in Fig.5 to 12.

Table 4. The proportion of component land units in the current situation for dryland

Under grade of Land proportion	Intensity of limitation	Basic limitations	land components
N_1eg	drastic	spall ، erosion	3-1-1
N_1eg	drastic	spall ، erosion	3-1-2
N_1eg	drastic	spall ، erosion	3-1-3
N_1eg	drastic	spall ، erosion	3-2-1

Table5. The proportion of components in the current situation of land for pasture

Under grade of land proportion	Intensity of limitation	Basic limitations	land components
N_1eg	drastic	spall، erosion	3-1-1
N_1eg	drastic	spall ،erosion	3-1-2
N_1eg	drastic	spal ، erosion	3-1-3
S_3e	drastic	spall، erosion	3-2-1

Table 6. The proportion of the components in the current situation of forest land

Under grade of Land proportion	Intensity of limitation	Basic limitations	land components
S_3e	medium	erosion	3-1-1
S_3e	medium	erosion	3-1-2
S_3e	medium	erosion	3-1-3
S_3e	medium	erosion	3-2-1

Table 7. The proportion of the components of the land in the future for irrigated agriculture

Under grade of Land proportion	Requirement revisory operations	grade of Current proportion	land components
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-1
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-2
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-3
S_3e	banquette and other operatins of soil protection	N_1eg	3-2-1

Table 8. The proportion of the components of the land in the future for dry land

Under grade of Land proportion	Requirement revisory operations	grade of Current proportion	land components
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-1
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-2
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-3
S_3e	banquette and other operatins of soil protection	N_1eg	3-2-1

Table 9 .The proportion of the components of pasture land in future

Under grade of Land proportion	Requirement revisory operations	grade of Current proportion	land components
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-1
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-2
S_3e	banquette and other operatins of soil protection	N_1eg	3-1-3
S_2e	banquette and other operatins of soil protection	S_3e	3-2-1

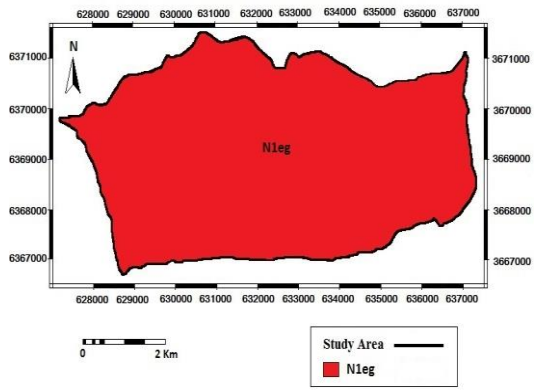

Figure 5. Current land use for irrigated agriculture

Table 10 . The proportion of components of forest lands in future

Under grade of Land proportion	Requirement revisory operations	grade of Current proportion	land components
S_2e	banquette and other operatins of soil protection	S_3e	3-1-1
S_2e	banquette and other operatins of soil protection	S_3e	3-1-2
S_2e	banquette and other operatins of soil protection	S_3e	3-1-3
S_2e	banquette and other operatins of soil protection	S_3e	3-2-1

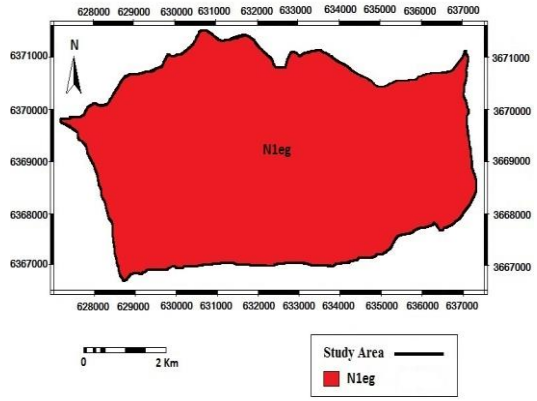

Figure 6. Current land for dryland

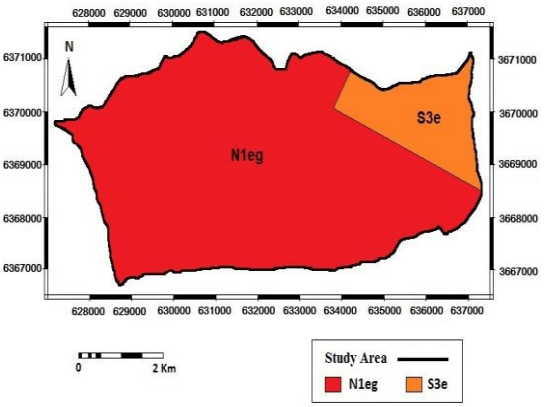

Figure 7. Current land use for pasture

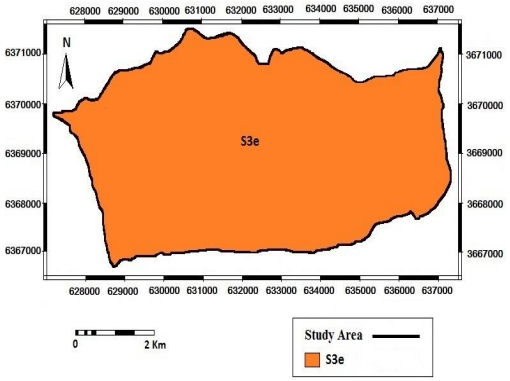

Figure 8. Current land use for forest

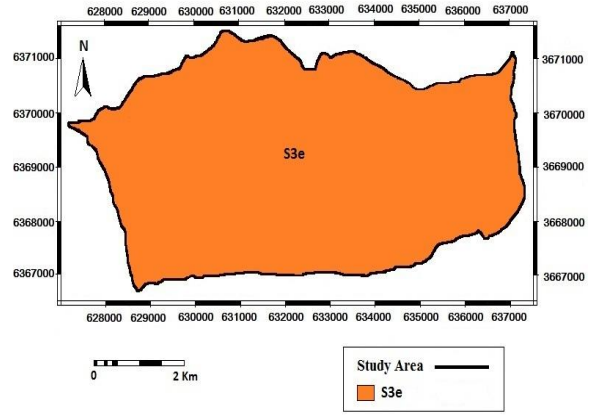

Figure 9. Future land use for irrigated agriculture

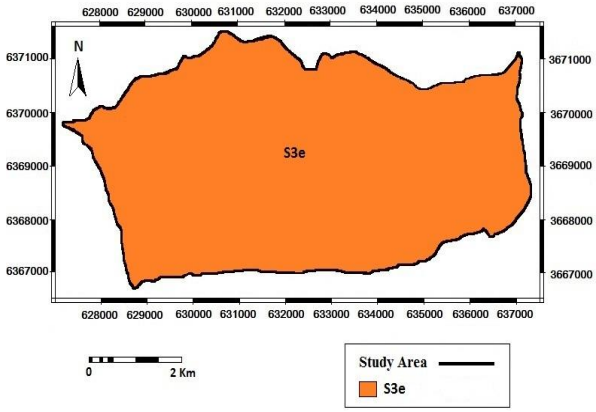

Figure 10. Future land use for dry land

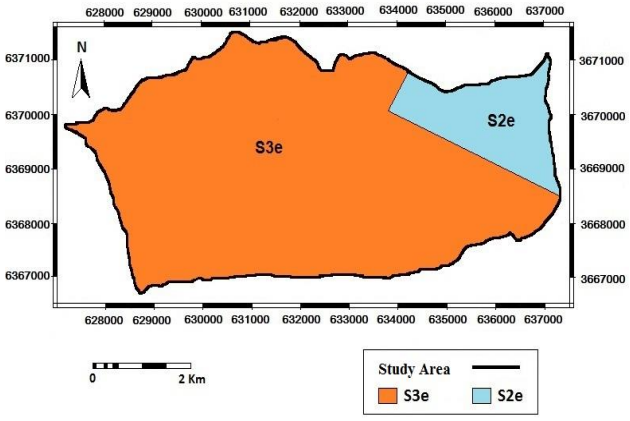

Figure 11. Future land use for pasture

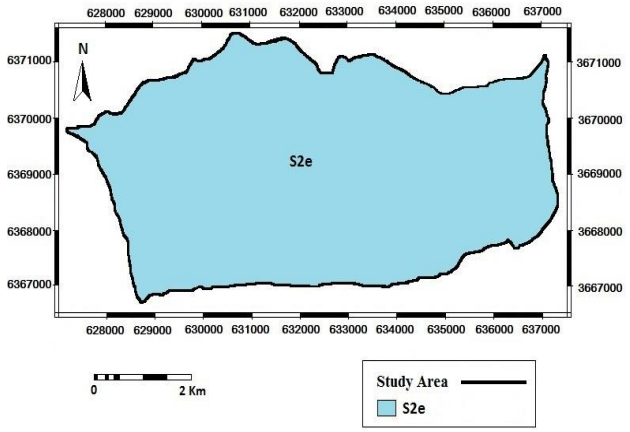

Figure 12. Future land use of Mohsenab watershed for forest

Conclusion

In the management of land use change, balance between different environmental parameters affecting plant growth should be considered. In the area of the land use change management is an important factor, in sustainable development of land.

In Mohsenab region restrictions including: Low and irregular rainfall land the lack of surface water suitable, shallow soil, imbalance of nutrients such as phosphorus and organic matter heterogeneous are the main problems. With organic mattering the soil can increase water-holding capacity as well as aggregate stability will be good. Nutrient availability for plants will increase with increase the organic matter. It is recommended that in addition to restoring the vegetation, investigate the removal of the soil cover, soil conservation and banquette strategies, and implement increasing of organic matter.

Other operations that have positive effect on improving land use could be considered:

-Water erosion control in the case of soil conservation

-revival of pastures, by preventing excessive grazing and seeding in pastures, balance between live stock and pasture, soil conservation and the protection of vegetation

-Stop plowing the land more than 12%

-Comprehensive and coordinated management and use accordance with the land capability

-Minor leveling and collection of surface gravels in areas that are necessary.

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