

The Appraisal of Land Use Changes and its Influence on Soil Quality Indexes in Gambue Region Western of Khuzestan Province

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ABSTRACT: The increase in human population has increased the expectations of life standards and scarcity of natural resources. Today, there is a consensus that land-use change is one of the main causes of the change in the quality of the soil in the environment. Due to the importance of this issue, a study was conducted on the land-use changes and effects of these changes on some of the qualitative indicators of soil in an area of 3000 hectares in Gambue region western of Khuzestan Province, Iran. The results of this research showed that by changing land-use from rangeland to irrigation farming and forest, the amount of soil pH and sand particle percent increases and silt content decrease. As the result of ignoring such rules the quality of soil will gradually declined and this vital environmental platform will face a serious crisis.

Keywords: Soybean, salinity stress, germination index

INTRODUCTION

According to (Carter et al., 2007) soil quality is the constant ability of a soil to accomplish its tasks as a live vital system with various applications in the ecosystem. This vital system not only should maintain the trend of biologic production, but also should enhance the weather quality and meet the health requirements of humans, plants, and animals. Soil quality has two aspects: 1) Intrinsic quality, which is the natural ability of the soil to perform its tasks (biologic production, enhancing weather quality, and meeting the health requirements of plants, humans, and animals). This quality, which is not affected by soil management, is dependent on soil formation (pedogenesis) and the effective soil forming factors; and 2) Dynamic quality, which varies depending on the type of soil management. Furthermore, instead of being directly measured, it is estimated by measuring some certain indicators. The type of the indicators that are used is also dependent on the scale and objectives of the research. (Lal, 1997) believes that, given the agricultural objectives, soil quality is the sustainable ability of soil to produce. Hence, there exists a close relation between sustainable agriculture and soil quality. Moreover, the instabilities are partly caused by the decrease in soil quality over time. Understanding how land-use change affects soil quality requires long-term analysis of reports on occupancies and study of the effects of land-use change on soil properties. Analysis of the changes in the degradation and quality indicators of soils in pastures converted to agricultural lands, not only reflects the impacts and consequences of the conversion, but also can be a guide for determining the way of dealing with this problem and preventing more soil degradation and destruction on these lands (Haj-abbasi et al., 2007). (Lal, 1994) argues that measuring the physical quality of a soil gives the situation and condition of the physical properties of the soil. He also believes that these properties affect biomass production and the environment as well. The effective physical properties of soil include its: texture, bulk density, structure, characteristics and pore distribution, and its moisture stress and aggregate contents. According to (Khan et al.,

2007) the existence of drastic differences between soils intrinsic properties adds to the possibility of presenting unrealistic and, sometimes, misleading interpretations. Hence, some of the critical properties of surface the soil (such as its acidity, and its sand, silt, clay, and calcium carbonate contents), which leave undeniable effects on soil quality indicators, should be determined.

MATERIALS AND METHODS

Study area

The region under study, with an area of 3000 hectares, is a part of Gambue region that is located western of Khuzestan Province, Iran. According to the metric system Gambue Region is located in Ahvaz County with a longitude of 26°56' to 26°65'E, and latitude of 34°74' to 34°75'N. This region was previously a rangeland by nature but a large part of it, which was near the intact pastures, was converted into irrigation farming and forest.

Method

24 soil samples with approximate weight of 2 kilograms were randomly selected at depths of 0-30 cm from three land uses including natural pastures, irrigation farming and forest .After air-drying and pulverizing operations, the samples were sieved by a No. 10 sieve. Moreover, In order to perform the tests according to the opinions of some of the researchers, certain soil physical properties including its texture class, its sand, silt, and clay contents, and its chemical properties such as its pH (acidity) were transferred to Soil Laboratory of Science and Research Branch, Islamic Azad University, Khuzestan for the purpose of evaluating its quality.

Statistical Analysis

Following to collecting the data and storing it into MS Excel software, the SPSS software was used in the statistical analyses and the independent Doncan test that was carried out at a confidence level of 5%. A comparison of the average similar properties of different land uses was carried out by performing the Doncan test at a confidence level of 5%.

RESULTS AND DISCUSSION

Table 1. comparison of the mean soil quality indicators in different land uses in the area

Land Use	Index Mean			
	(%)Sand	(%)Silt	(%)Clay	pH
Rangeland	32.9 ^b *	57.64 ^a	9.41 ^a	7.32 ^c
irrigation farming	63.27 ^a	27.61 ^{ab}	9.08 ^a	7.66 ^b
Forest	47.18 ^b	41.84 ^a	10.95 ^a	7.73 ^a

*: according to the Duncan test that is performed at a confidence level of 5%, there is no significant statistical difference between the numbers in columns with common letters

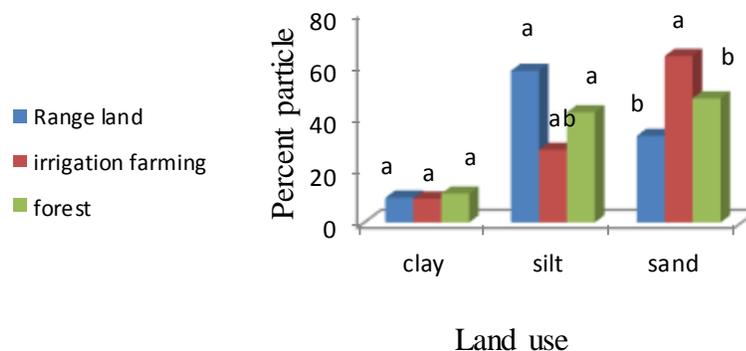


Figure 1. comparison of soil aggregates content in the different land uses under study (Similar letters show that in performing the Duncan test at a confidence level of 5%, no statistical difference is observed)

According to Figure 1, analysis of the aggregation of the soil in the area shows that no statistical difference is seen between the clay contents of the soils in pasture, irrigation farming and forest using the Duncan test at a confidence level of 5%. However, the amount of the silt and sand content has changed drastically after conversion of the land from rangeland to irrigation farming and forest. The reduction in soil formation, induction of water and wind erosion. This can expose the soil directly to wind and rain and consequently increase soil erosion and reduce its silt content. The increase in the sand and decrease in silt content by changing land-use from rangeland to farming is also proved by (Emadie and Bagher-nezhad, 2007). (Click, 2005) states that during the erosion process and separation of soil particles, silt particles are separated and are transferred to downstream regions.

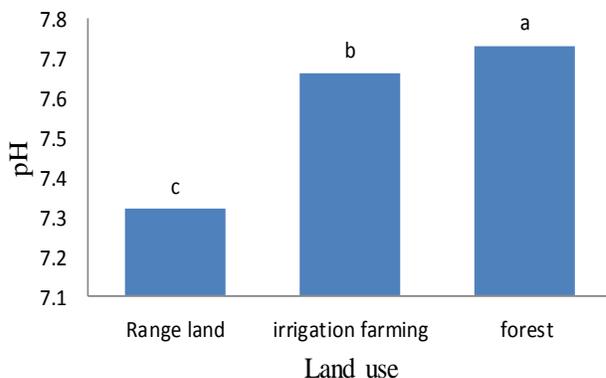


Figure 2. comparison of soil reaction (pH) in different land uses under study
(Similar letters show that in performing the Duncan test at a confidence level of 5%, no statistical difference is observed)

According to Figure 2 and based on the results of the comparison of the mean values presented, in performing the Duncan test at a confidence level of 5% significant difference was observed between the degree of soil reaction in pasture, irrigation farming and forest land uses. By changing land-use from rangeland to irrigation farming and forest, the amount of soil pH increases because of increase in sand and then infiltration of water into soil. The results of the study of soil reaction in this research are consistent with the results obtained by (Haj-abbasi, 2007) in his study of the physical and chemical properties of soils (including their reaction) in South and South West of Isfahan.

CONCLUSION

Destructive land-use changes and improper management affect the properties of the vegetations of pasture ecosystems. A comprehensive analysis of different morphological, sociological, and other changes that have occurred in vegetations as the result of these changes can clarify these aspects. Soil quality indicators of irrigation farming and forest and soil degradation indicators are demonstrated in these lands more than in the degraded rangeland. The overall conclusion is that handling the slowly renewable natural resources and sustainable utilization of them are the main principles of the sustainable development of each society. Although ignoring such rules may not induce complications in the short-term, natural resources will lose their productivity for humans and harsh consequences will be experienced.

Therefore in sum it is recommended to:

1. Because of destructive effect which have made on region soils it's better to prevent the development of irrigation farming.
2. Controlling of erosion in region:
 - a. Prevent from onseasonable grazing of livestock.

- b. Plant appropriate especially development of native vegetable of region.
- c. Giving humos to the land.

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