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Research Article

ROLE OF PHYSICAL AND CHEMICAL SOILS PROPERTIES IN EROSION AND GULLY FORMATION IN DASHT-E-YARI PLAIN, CHABAHAR, IRAN

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ABSTRACT
The aim of present study was to investigate the physical and chemical properties of soils in erosion and gully formation in Dasht-e-Yari plain, Chabahar, Iran. In order to perform various physical and chemical tests such as aggregation, Atterberg limits, Cl, EC, SAR and ESP, 9 soil samples were taken from different parts of the plains. For experimental study, first soil samples were dried in vitro and open air. After hitting, passed through a 2-mm sieve and were stored in specific plastic containers for doing tests. The results suggest that most of the region under study, according to the Unified Soil Classification is silt and silt-clay. Samples result showed divergence 23-24% and plastic limit 5-6%, sodium absorption ratio (SAR), exchangeable sodium percentage (ESP) and sodium percentage of soil (Ps) level is high, the electrical conductivity is changing between 9.52 to 34.8, and Calcimetery the lime soil level was between the of 10 to 21% that is changing the so-called "known as mudstone.

Keywords: *Dasht-e-Yari, Disperse Soils, Silt and Clay, Mechanical Erosion*

INTRODUCTION
Assessing the impacts of climatic and land use changes on rates of soil erosion by water is the objective of many national and international research projects (e.g. Nearing, 2001). However, over the last decades, most research dealing with soil erosion by water has mainly focused on sheet (interrill) and rill erosion processes operating at the (runoff) plot scale. This is seen in the numerous field studies where runoff plots have been established in order to assess soil loss rates due to sheet (interrill) and rill erosion under various climatic conditions or land use practices (Kosmas *et al.*, 1997) and the use of both empirical and process-based field-scale and catchment-scale soil erosion models (Jetten *et al.*, 1999), addressing mainly sheet and rill erosion, for assessing soil erosion under global change or for establishing soil erosion risk maps at various scales (Van *et al.*, 2000). However, in many landscapes under different climatic conditions and with different land uses, one can observe the presence and dynamics of various gully types, i.e. ephemeral gullies, permanent or classical gullies and bank gullies. Gully erosion is a form of water erosion that is very dangerous and in some cases causes the high length, width and depth channel (Wang *et al.*, 2006). And if the erosion extended led to the thousands valley eroded, and in the land happens to their susceptibility to erosion, which can be part of the ground to be broken. And the consequences of erosion, including the loss of soil, sediment in the reservoirs and the loss of arable land and vegetation (Ezochi, 2000). The highest number of surveys, studies and scientific research of gully erosion has been done in recent decades (Zachar, 1982). This is because scientific research on a variety of soil erosion by water than by farm and watershed areas are mainly in the past been limited to research plans (Baade 2000). Complex process of formation and development of the ditch is due to different environmental conditions and different measures of resource utilization in the soil, water and plant (Bobrovistskaya, 2000). Non-sticky silt and very fine sand with very low adhesion are seen in this phenomenon. The mechanical nature of the phenomenon is divergence and different clay minerals in the soil. Sensitive to water and is easily eroded and scour internal (Elges, 1985). Property divergence observed in clay, these soils generally have high sodium uptake. Often divergent soil swelling and shrinkage of high potential, low resistance to wear and low permeability (Rahimi *et al.*, 2008). Reducing the amount of salts dissolved in water in contact with the soil surface increases the scour. Increasing the concentration of salts in water, soil erosion stops (Statton *et al.*, 1977). Furthermore, gully channel development increases runoff and sediment connectivity

in the landscape, hence increasing the risk for flooding and reservoir sedimentation significantly. Over the last decade, significant progress in the understanding of gully erosion and its controlling factors has been made. Yet, there are still several unanswered questions related to gully erosion. However, the aim of present study was to investigate the physical and chemical properties of soils in erosion and gully formation in Dasht-e-Yari plain, Chabahar, Iran.

MATERIALS AND METHODS

Dashtyari area located in southeast of Chabahar city and south of Sistan and Baluchistan Province. It has area about 645.31 km2 and located in 61° Eastern length and 26° Northern latitude. Access road to this area is Zahedan- Chabahar road. In order to perform various physical and chemical tests such as aggregation, Atterberg limits, Cl, EC, SAR and ESP, 9 soil samples were taken from different parts of the plains (Figure 1). For experimental study, first soil samples were dried in vitro and open air. After hitting, passed through a 2-mm sieve and were stored in specific plastic containers for doing tests.

RESULTS AND DISCUSSION

The results suggest that most of the region under study, according to the Unified Soil Classification is silt and silt-clay (Figure 2). This represents the region's poor soil texture and flood season is fast eroding.

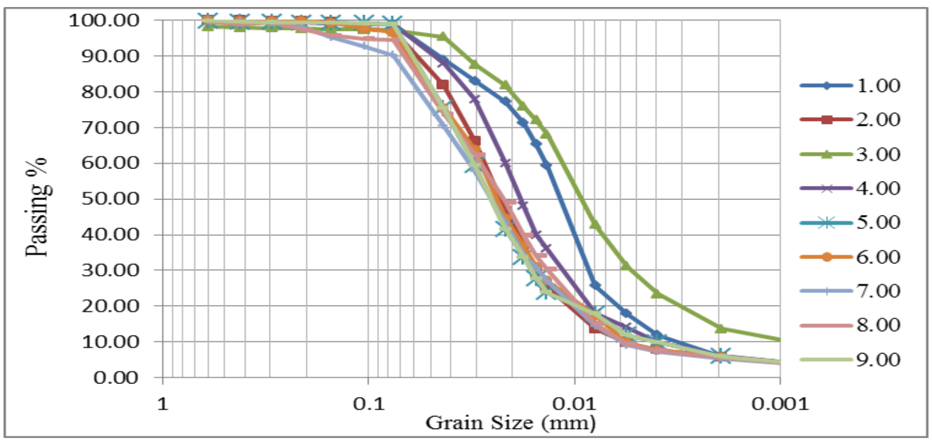

Figure 1: Aggregation results

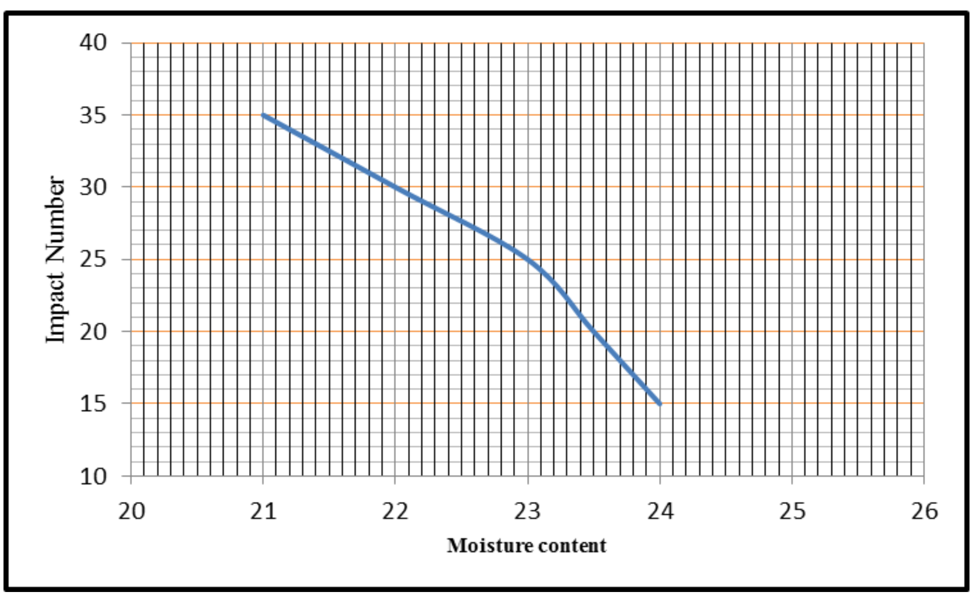

Figure 1: Moisture content of Samples

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Atterberg way to describe hypersensitivity associated with percent change in moisture content of fine-grained soils developed under a contract, depending on the moisture content, the nature and behavior of soil can be divided into state of four-Solid and Pastiness semi-solid and (plastic) and liquid (lubricant). Samples result showed divergence 23-24% and plastic limit 5-6% (Table 1).

Table 2: Result of Atterberg limit

Sample No	1	2	3	4	5	6	7	8	9
LL	NL	NL	24	NL	23	23	NL	24	NL
PI	NP	NP	5	NP	5	6	NP	6	PI

Results showed that sodium absorption ratio (SAR), exchangeable sodium percentage (ESP) and sodium percentage of soil (Ps) level is high (Figure 3 and 4). Each of these factors increases the cautions Na + absorption is increased and thus the soil will be more likely to diverge.

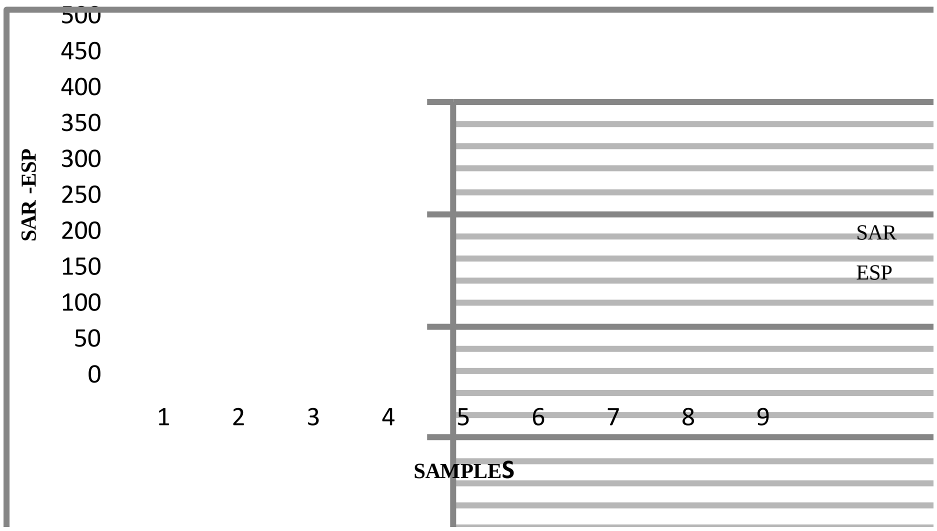

Figure 3: Relation sodium uptake and exchangeable sodium percentage level

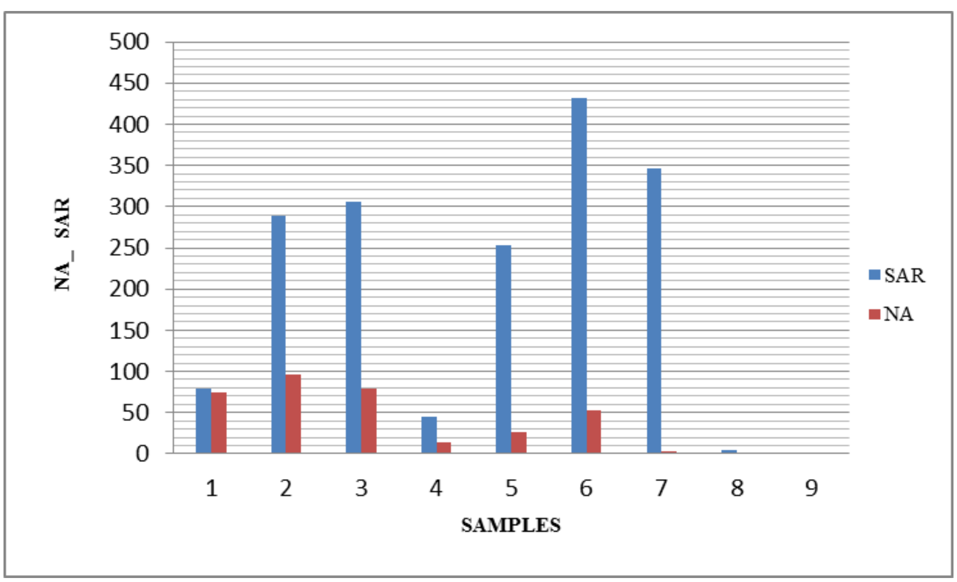

Figure 4: Sodium and sodium uptake percentage level

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And Na saline soils have large amounts of calcium, sodium, or both. Soil that has high sodium PH about 5/8 or more is salt. Salt concentration in the soil solution is based on the ability of salts in the soil electrical conductivity, are determined by the conductivity meter. The results show that the electrical conductivity is changing between 9.52 to 34.8.

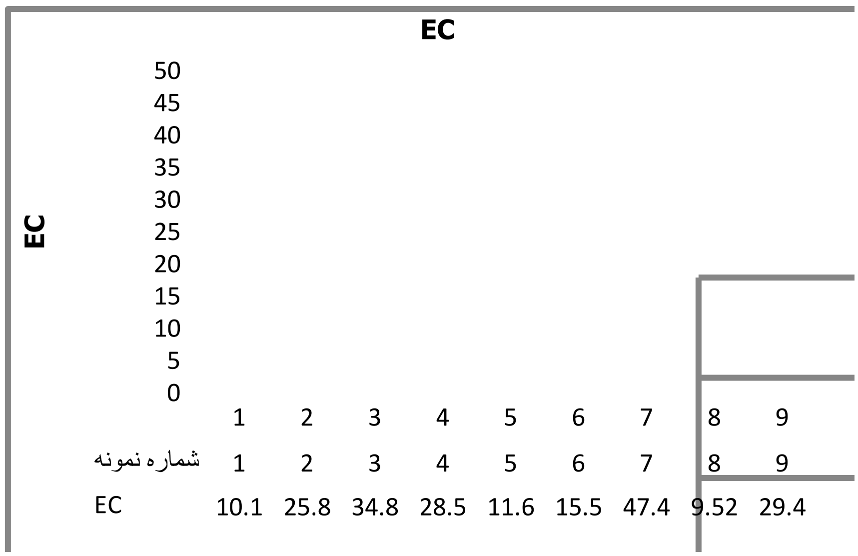

Figure 5: Electrical conductivity of samples

According to the results of samples Calcimetery the lime soil level was between the 10 to 21% that is changing the so-called "known as mudstone (Figure 4).

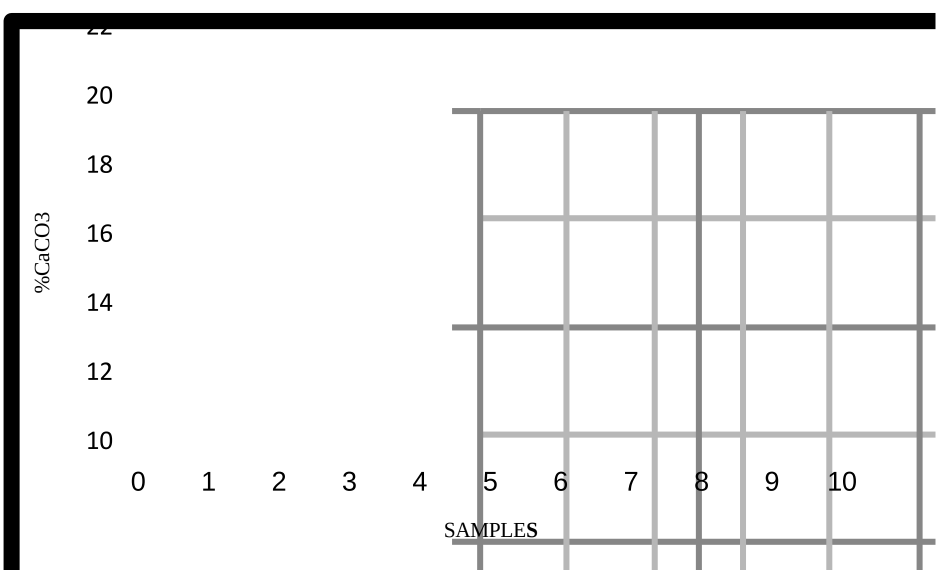

Figure 6: Calcimetery of samples

The Unified Soil Classification of studied soils showed silt texture in study area. The main problem soils have little strength when blows the rain and the flooding of the soil. Soil surfaces once down, soft, and possible disruption is accelerated and thus pull down happens. Parameters of electrical conductivity (EC), sodium adsorption ratio (SAR) and exchangeable sodium ratio (ESP) show a high level. The best strategic solution for prevention and control of gully erosion in the studied area and the areas with similar environmental conditions can be prevention of surface runoff concentration and land rehabilitation together with vegetal cover management, particularly controlling over grazing by livestock, improper road construction and cutting trees and shrubs throughout the watershed.

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