



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

**ASSESSMENT OF GEOMORPHOLOGIC IMPACTS ON URBAN
SETTLEMENTS A CASE STUDY ON ALLAMARVDASHT DISTRICT IN
LAMERD (FARS PROVINCE)**

MARZIEH MOGHOLI

Assistant Professor, Islamic Azad University Larestan Branch, Iran

***Corresponding Author: E Mail: mmoghali@yahoo.com; Tel: [+98-781-2249840](tel:+98-781-2249840),**

[Fax: +98-781-2249845](tel:+98-781-2249845)

ABSTRACT

Geomorphologic factor is one of the major and effective factors in the location and development of human settlements. It sometimes causes urban and rural developments and sometimes limits their growth. Allamarvdasht is located at the north of Lamerd city and south of Fars Province. This region has a warm and dry climate including a flat plain with several anticlines surrounding it from north and south. In recent years, ditch-like erosions of Allamarvdasht River have destroyed natural resources and threatened human's establishments. Moreover, shortage of water resources is a problem that has influenced growth of settlements in Allamarvdasht district. Therefore, we identified and assessed effective natural factors in the establishment and development of the city and villages of Allamarvdasht district. Then, following the analysis of our findings, we divided the district into 6 zones based on residential capacities. We found that mountainside fields and alluvial fan bases possess the most capacity for residential developments since they bear water resources and suitable soil texture and slope while low lands in this field have undesirable soil and water with steep mountain slopes.

Keywords: Allamarvdasht, geomorphology, settlement, soil and water, zoning

INTRODUCTION

Generally, there are two effective factors in the establishment and dispersion of settlements. They are considered as geographic basics. They include: 1) natural factors; 2) cultural factors; and 3) social-economic factors. Studied performed in this field indicate the structure of establishment system is formed based on

natural basics and meanwhile is influenced by human agents. Side effects of natural phenomena on location, dispersion, zone of penetration, physical development, communications, and urban and rural morphology are the most effective factors. Results of several assessments show that besides human agents, distribution of settlements and population take the influence of natural factors. Restrictive natural factors such as altitude, high gradient, and unsuitable type of lands like mountains and torrential plains play a negative role in the spatial distribution of settlements and population. On the contrary, suitable height and land types have a positive and significant effect in the establishment system of settlements and population (**Estelaji and Ghadiri Masum, 1384, P.133**). Residential pattern in settlements (specially rural settlements) mostly reflect features of natural environments. Side effects and natural phenomena in location, dispersion, zone of penetration, physical development, communications and morphology of residential centers are considered as the determining factors. Overall, we should regard the following cases in the assessment of efficient natural factors on the establishment of settlements: climate, topographic landforms, and the way to access soil and water resources. Among these, geomorphologic factors and features

are relatively stable. Besides, they are outcropped and observable morphologically allowing us to evaluate them. However, human agents are changing and dynamic.

Humans search for places where there are proper facilities for agricultural activities. Therefore, natural potentials such as suitable soil, plane fields, nice climate, and runoffs provide a good background for establishment (**Saeedi, 1377, P.44**).

The aim of this research is to assess the effective geomorphologic factors on positioning and development of Allamarvdasht settlements, the degree of this effect, and finally zoning of the study area according to the possibility of residential developments.

Research Background

Along with the clarification of the impact of natural factors on urban and rural developments, Leonardo Hell addressed morphological bodies of cities in his book published in 1963. He asserted morphologic body of a city is indicative of spiritual needs and value systems of citizens (**Moghimi, 1388**). In 1968, Leopold made a relation between urbanism and hydrograph unit changes besides considering the importance of land use features. Moreover, he analyzed the interactions between hydrology and urbanization as well as the effects of urban buildings and showed that there is a direct

relation between fluvial overflows and urban developments (**Rajaei, 1373**). In **1968**, **Klavi and Taylor** declared that mountainsides with a gradient more than 15% are generally unstable and must be determined for public open space within urban borders. In 1978, Et Water used landside maps for the reduction of building accumulation in various land use regions in California (**Gudarzinejad, 1377**).

Negaresh (1382) in his article entitled "Use of Geomorphology in Urban Positioning and its Outcomes" evaluated the role of geomorphologic factors in the establishment of urban settlements and their impacts. **Ghadiri Ma'sum et al (1386)** in an article entitled "Assessment of the Relation between Geographic Basics and Dispersion of Rural settlements in Arid Lands", which was a case study of Khur District and Biabanak in Naen Township concluded human agents play a more significant role in the dispersion and stability of rural settlements in dry regions compared to natural factors. In addition, **Estelaji and Ghadiri (1384)** in their article entitled, "Assessment of Geographical factors in establishment system of settlements" emphasized on quantitative techniques in a case study of Wilkage region as a subsidiary of Namin township inferred that besides natural situations, applicable positions of rural settlements

influence on the establishment system of settlements.

In another study entitled "Analysis of Patterns of Spatial Establishment of Rural Settlements in Charmahal & Bakhtiari Province", **Seidaee and Nowruzi Avargani (1389)** concluded the spatial establishment pattern of settlements in this province have been further organized under the influence of natural factors (eg. Uneven lands, climate, rivers) as well as human agents and in some cases a combination of multiple factors while their dispersion pattern is known to be largely of a linear type. As we can see, although numerous studies have been carried out on this issue in some rural and urban regions in Iran, no investigations have been conducted in the study limits.

Study Area:

Allamarvdasht District is of Lamerd Township subsidiaries to the south of Fars Province. It is located between 27° 28' to 27° 54' N latitude, and 52° 36' to 53° 18' E longitude with an area of 1240 km² and an average altitude of 430 m above sea level. The highest point of the study area is Nar Mount to the south of the region with the height of 1819 m and the lowest part is 364 m high to the northwest of the field.

Central part of this district is Allamarvdasht city with a population of 3650 people based on a public census

performed in 1385. 1506 people are populated in Allamarvdasht district. The district consists of two rural sub-districts called Allamarvdasht and Kheirgu, an urban center (Allamarvdasht city) with 45 villages 33 of which possess over 20 families and 15 others with less than 20 families (**Figure 1**).

METHODS AND MATERIALS

The method applied in this article is based on an analytical zoning approach within which we have identified geomorphologic factors surrounding Allamarvdasht district settlements and then evaluated the present potentials and restrictions accordingly. Finally, with regard to geomorphologic positive and negative factors besides other effective environmental factors in the development of the region, we provided zonation map of Allamarvdasht district according to the developmental potential of its urban and rural settlements.

In order to gather necessary data, we used library methods and field observations in addition to several other methods and instruments such as Global positioning system (GPS), geologic numerical maps, topography, drainage network, land use, vegetation, and aerial and satellite pictures. To sketch maps and graphics, we applied Arc view GIS, Arc GIS 9.2, and Adobe Photoshop software and used Excel software for statistical data analysis.

Efficient natural factors in the developments of Allamarvdasht district settlements:

Geologic factors:

Based on the division of constructional-sedimental units (**Nabavi, 1355**) and the development of sedimental fields in Iran (**Eftekharnjad, 1359**), Allamarvdasht regions is located within Zagros zone including part of folded Zagros (Watershed Management of **Fars Jahad Keshavarzi, 1380**, 6). Stratigraphy of Allamarvdasht region with regard to the order of oldness is as follows: upper Cretaceous period, lower Paleocene period with marl limes of Bangestan group and Pabedegurbi Marls observed at margins and on Bangestan group formations. Paleocene to Eocene periods of the region is marked with Asmari-Jahrom limes with a low thickness and high expansion. These formations are further outcropped in the southern anticline of Allamarvdasht field (Nar Anticline, Varavi). Miocene and Paleocene periods are determined by Fars group formations (Gachsaran, Mishan Aghajari) most of which is evaporative. They have mostly been developed at the margins of the field. Paleo-Pleistocene period recognized at the region is indicative of Bakhtiari Conglomerates, which are extended as a strip along the southern margins of Allamarvdasht field (**Office of Water**

Resources Assessments, 1363, 5) (Figure 2).

One of the major impacts of geologic factors of the region is known to be the effects of geologic formations on their hydrology and ultimately on the establishment of Allamarvdasht settlements. Since water plays a vital and significant role in the establishment of settlements especially in arid and semiarid areas, residential development is directly dependent on water resources taking the influence of geologic conditions in turn.

Formations constituting Allamarvdasht southern anticline (Varavi anticline) are mostly of a calcareous type with the most evident outcrops of Asmari limes. Erosions produced by the destruction of these formations at the high mountainsides create sedimentary depositions of alluvial fans relevant to lithologic features of each formation. The presence of calcareous rubble stones with a suitable penetrability inside alluvial fans and Quaternary sediments leads to the formation of ground aquifers, better quality of water resources and establishment of settlements at the mountainside of this anticline. However, in the northern anticlines of Allamarvdasht field (Tang-e-Khur and Hava anticlines), Fars group evaporative sediments are further extended to reduce the quality of ground water in the northern part after being carried onto the field surface by

erosional factors. This reason has led to a more qualitative and quantitative desirability of southern ground water and the development of Allamarvdasht southern settlements is due to this factor.

Another geologic feature of Allamarvdasht region can be mentioned as the absence of active and destructive faults. Main faults in the region include sliding faults, which drive towards southwest. Right slide faults are also seen as minor faults in the region (Iranian Geologic and Mineral Discoveries Organization, 1384).

Due to lack of active faults in Allamarvdasht field, this region can be exposed to the risk to average earthquakes (**Puyesh Nouaver Consultant Engineers, 1382, 2**). Since 1393 to July, 2010, about 29 earthquakes have occurred in Allamarvdasht field (International Research Station of Seismology and Earthquake Engineering, 1389). According to Iranian southern spatial dispersion map of earthquakes greater than 5.5 Richter (**Figure 3**), no earthquakes with such intensity has been recorded in the study area, which accounts for the region's geologic positive potential and development of settlements.

Based on pedology, many land units in Allamarvdasht field are of saline and alkaline soil indicative of a major restriction, which has caused a change in the natural landscape and even land use.

Since saline soil has no potentiality for use (especially in agricultural section), it has been fully influential on the demographical settlements and types of activities conducting over the area. This is to be known as an important and restrictive factor to the establishment of population over field with a low gradient for this reason mountainside soil has no potentiality for use (especially in agricultural section), it has been fully influential on the demographical settlements and types of activities conducting over the area. This is to be known as an important and restrictive factor to the establishment of population over fields with low gradient. For this reason, mountainside soil shows an appropriate natural condition with a good land slope and proper depth of water resources compared to the soil limitations of uneven mountainous areas and marshy fields without slope.

In upper sections with alluvial fans, lighter soil texture and rather favorable permeability of soil have led to the formation of ground aquifers and attraction of population so that all the settlements of Allamarvdasht district are located at the foot of alluvial fans and their interfaces with the field surface. This area has the advantages of low gradient, suitable soil and most importantly more water resources.

Geomorphologic factors:

Geomorphology is the science of identification of various uneven landforms (Khayyam, 1385).

Geomorphologic studies mostly concerns identification and comparison of uneven landforms and depositions due to them. The study area has been constituted of two geomorphologic units called Kuhestan and Dashtsar. Khuestan unit includes two types mountains (with 7 faces) and hills (with 6 faces) and Dashtsar consists of 3 types called Erosive, Appendage and Covered Dashtsar with 16 faces. Mountain-type lands have a high gradient (4-0%-100%) and shallow soil. Furthermore, soil texture is light in these lands. Hill types are with a low gradient of about 15-40% with a very shallow to shallow soil and light texture. Erosive type of Dashtsar is within the height of 450-600 m and gradient of 8-15%. Appendage Dashtsar is 450-550 m high with a gradient of 4-8% and covered Dashtsar is with the gradient of 1-4% and 400-500 m high covering a large area. This type includes a rather flat alluvial plain with a low slope in which a deep ground aquifer is located and less gravels and rubble stones are observed. Deep alluvial tiny-grained soil and suitable water resources have caused most agricultural lands to be concentrated on this area (**Consultant engineer, Haseb Karaji, 1386**).

Major cumulative faces in Dashtsar unit are alluvial fans. In Allamarvdasht alluvial fans, rather proper soil texture and penetrability have led to the formation of ground aquifers, which in turn has attracted population so that all the settlements of Allamarvdasht district are established at the foot of alluvial fans and their interfaces with the field surface.

Mountainside directions and their impacts on the dispersion of Allamarvdasht settlements:

Most settlements of Allamarvdasht region have been established along a continuous strip at the northern side of Nar anticline (Varavi). About 76% of residential parts are located in Allamarvdasht district and over 93% of the population at the northern side of this anticline. This problem is clearly indicative of the role of mountainside directions in the settlement dispersion of Allamarvdasht district. This concentration is due to the existence of water resources, climatic differences of the two mountainsides, and desirable soil.

Slope:

Two types of slopes are observed at Allamarvdasht field one of which is due to the altitudinal difference between the field and the surrounding mountains producing a low gradient directed from high points towards the field center and the other is considered as the general slope of Allamarvdasht field oriented from

northwest to southeast (**Consultant engineers of Puyesh Nouavar, 1382, 3**).

Generally, Allamarvdasht field is a low land with a low gradient while its altitudinal difference along its 75-kilometer northwest-southeast direction is approximately 100 m. All the settlements of this district are located on an altitudinal level of 390 to 480 m.

Over 80% of residential points of Allamarvdasht district are located on a level with less than 5% gradient while the trend of urban and rural development is towards higher lands with more slopes and no progress occurs towards the field. Generally, slope is not considered as a preventive factor in the development of most settlements in Allamarvdasht, except for a few numbers of villages developed towards hills and mountainsides along north-west direction in recent years.

Climate:

Climate is one of the influential factors in human's life. Hence, researchers have always regarded it as one of the major components of geographical outlook and taken into account the accurate study of its features scientifically.

Allamarvdasht region has a warm climate with a low and irregular rainfall due to its location on the dry northern hemisphere belt and at sub-tropical high-pressure zone with a low altitude. Its average annual

rainfall has been about 268.63 mm during a statistical period of 22 years (**Allamarvdasht Pluviometric Statistical station, 1389**).

Of course, the number of dry periods with less annual rainfall is more than the average of the total period, but the occurrence of several humid years has led to an increment of average annual rainfall in Allamarvdasht. Nevertheless, about 68% of these years during this statistical period have received less rainfall than the annual average.

Summer season with 5.65% and winter season with 56.25% of the total annual rainfall are considered as the driest and most humid seasons in Allamarvdasht, respectively. Coefficient percentage of annual rainfall variations in Allamarvdasht is equal to 63.02% representing an irregular rainfall regime.

Another basic element of climatic identification is temperature as a representative of heat intensity. Due to lack of a Temperature Measurement Station in Allamarvdasht, we had to simulate the region's thermal parameter using Statistics of Lamerd Synoptic Station and based on the results, Allamarvdasht average annual temperature was obtained to be equal to 24.7 °C.

Omberothermic Diagram

Omberothermic diagram was sketched to determine dry and humid periods (**Figure 8**). According to this diagram, dry period in Allamarvdasht region beings at mid-Esfand and continues for about 9 months until early month of Azar. Therefore, humid months in Allamarvdasht are known to be Azar, Day, and Bahman (until mid-Esfand).

Generally, Allamarvdasht climate can be regarded as dry with deserts accounting for a mean warmness. This problem has led to a long warm period of the region, which is directly and indirectly (impact on agriculture ...) displayed as one of the factors for a low population in this district. Moreover, we can even consider climatic factor as one of the main causes of high migration rate in Allamarvdasht district. Severe thundershowers, frequent floods during some years, high rainfall frequencies during farming years, occurrence of severe and frequent droughts, high temperature, and long duration of warm period in the region (from early month of Farvardin to late Mehr), high degree of evaporation and even summer winds, storms associated with dust, and a humid and sultry weather during summertime can each be regarded as a climatic restraint to the development of human societies. Lack of favorable and sufficient rainfall and occurrence of high degrees of evaporation and transpiration

during warm seasons have led to a reduction of water resources in Allamarvdasht region and these problems will surely become more apparent with the passage of time.

Water resources are one of the major factors in the formation of spatial structures and establishment of biological complexes. There is no permanent river in Allamarvdasht region and surface runoffs put a trifle influence over the field. Ground water in the area is also finite with very weak aquifers. It is only limited to alluvial depositions and fans at the southern margin. Ground aquifers are also of a low potential due to low alluvium thickness. Moreover, because of a special geologic condition, aquifers can only be exploited along tributary floodways since the field's main aquifer is unusable due to low thickness (Fars Regional Sewage Organization, 1364, 27).

The same as other parts of Iran, water factor in Allamarvdasht district has been so important that populations of villages and the way they have formed as well as their future growth follow the extent of their accessibility to water resources. Allamarvdasht water resources at the mountainsides and surrounding fields are of a better quality compared to other expanses of the region. Hence, mountainside fields are observed as the main centers of population establishment

due to more suitable amounts of ground water. Thus, proper water resources at Allamarvdasht mountainsides have caused settlements to develop sequentially from northwest to southeast. In addition to alluvial resources, existence of calcareous aquifers with a proper quality at the south of Allamarvdasht field is of the major current potentials in the region. Southern margin of Allamarvdasht field is known to be a rich Karst aquifer because of the outcrop of Asmari formations in which numerous deep calcareous wells have been drilled.

There are no permanent rivers in Allamarvdasht region and its seasonal river cannot be exploited for drinking water and farming due to its unfavorable quality. Destructive floods of the early 70s (solar calendar) associated with the impact of human agents led to the river destruction and extended ditch-like erosions due to which many farms and pasture lands were ruined. Nevertheless, development of gullies would threaten human establishments and constructions such as transportation tracks, bridges, and electricity poles. Besides, drop of the river base point has caused a drop in ground water level and decrease of water quality. Therefore, the river's negative role is strengthened.

The existence of widest and most destructive gullies of Fars Province in

Allamarvdasht has represented this type of erosion as the most notable sort and threatening problem for farmlands, roads, and villages in Allamarvdasht region. This problem has changed most internal and external parts and even upper parts of Allamarvdasht field into salt deserts with an unfavorable topography.

Due to a less distance between the river and mountainsides at eastern compared to middle parts of the field, settlements are located on the higher slopes in order to prevent risk of the river as well as undesirable soil while some villages are completely situated on mountainsides.

Zonation of developmental capacities of the settlements of Allamarvdasht field:

Based on topography, gradient, climatic and soil conditions,... in addition to assessment of geologic maps and aerial and satellite pictures and field observations, Allamarvdasht district is divided into 6 zones of very good, good, average, weak, unsuitable, and unimportant zones according to developmental capacities of settlement. The zone of very good capacity includes present limits of settlements and their surroundings. It is located at geomorphologic type of Covered Dashtsar with the total gradient of 1-4%. This zone with a mild slope mainly situated at the base of alluvial fans consists of suitable ground water, and accessibility to substantial facilities such as water,

electricity, and transportation routes. In recent years, development of all the settlements of Allamarvdasht district has occurred within this zone. The zone with good capacity is naturally similar to very good zone but due to its location at a farther distance from settlements has a less importance according to its accessibility to substantial facilities. Besides, the need to provide sub-structures urges more expenses of building settlements in this zone. The zone with average capacity is located higher than good and very good zones with more gradient. Geomorphologically, this zone is classified in Appendage Dashtsar sub-type with the total gradient of 4-8%. It is situated with a more slope compared to very good and good zones and therefore bears a less importance and potential. The zone with weak capacity is located at the lower parts of villages and flood plains with a gradient of less than 1%.

Despite having a low gradient, these lands possess no suitable capacities for settlement developments due to clay, saline, and erodible soil, and water restrictions.

Finally, the zone with an unsuitable potential includes low lands of flood plains, clay *دقها*, and lands adjacent to Allamarvdasht River. This zone possesses a wider area at eastern part of Allamarvdasht field due to farther

development of lands with waterway and ditch-like erosions. The unimportant zone includes mountainous type. It is considered unimportant according to the location and development of residential parts

because of a high gradient, stone masses, irregular mountainsides, steep hills, and unstable Talus.

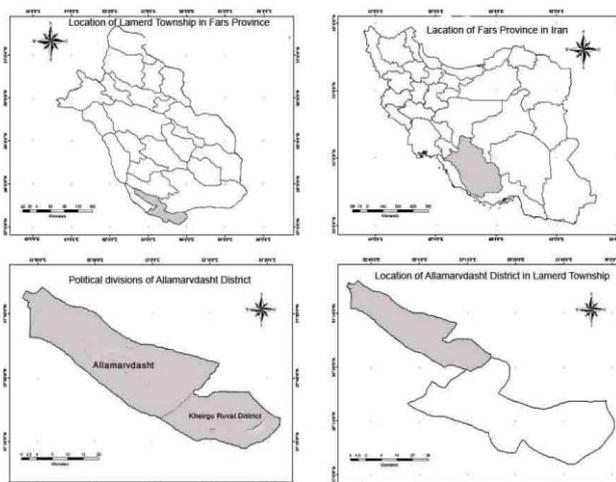


Figure 1: Map of sequential location of Allamarvdasht district

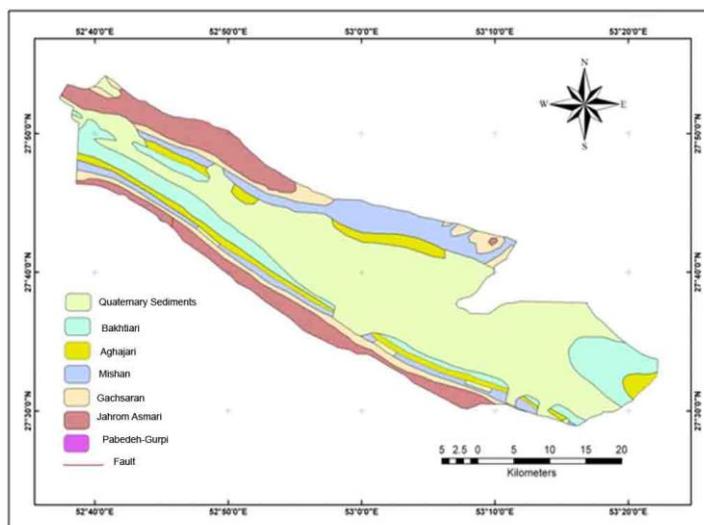


Figure 2: Geologic map of Allamarvdasht district

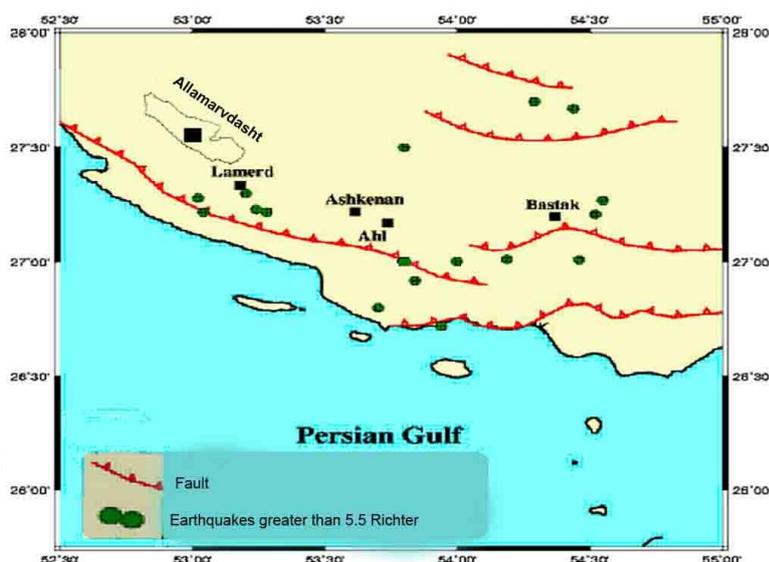


Figure 3: Important faults and spatial distribution of earthquakes greater than 5.5 Richter at south of Iran in the latest century

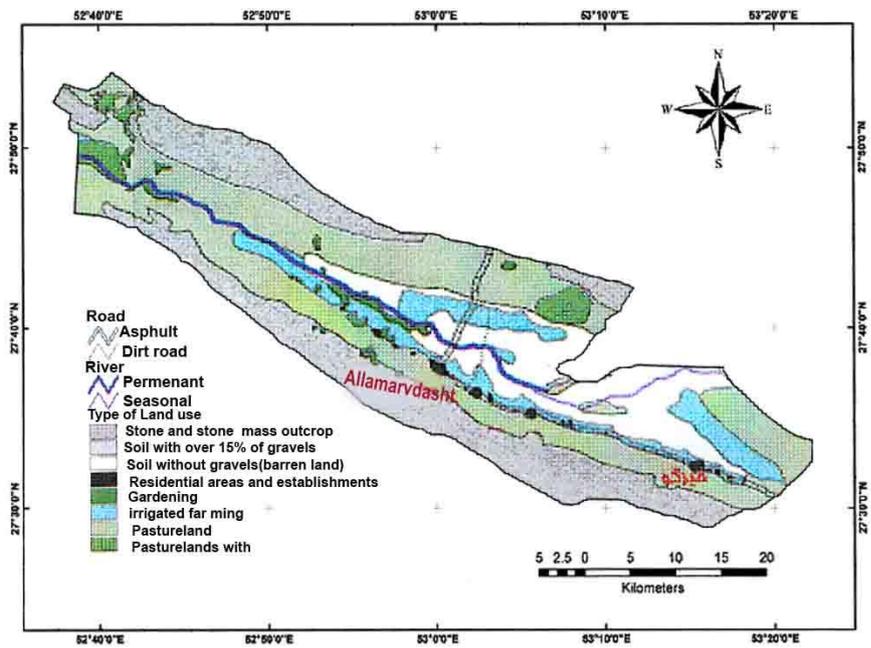


Figure 4: Map of land use of Allamarvdasht district

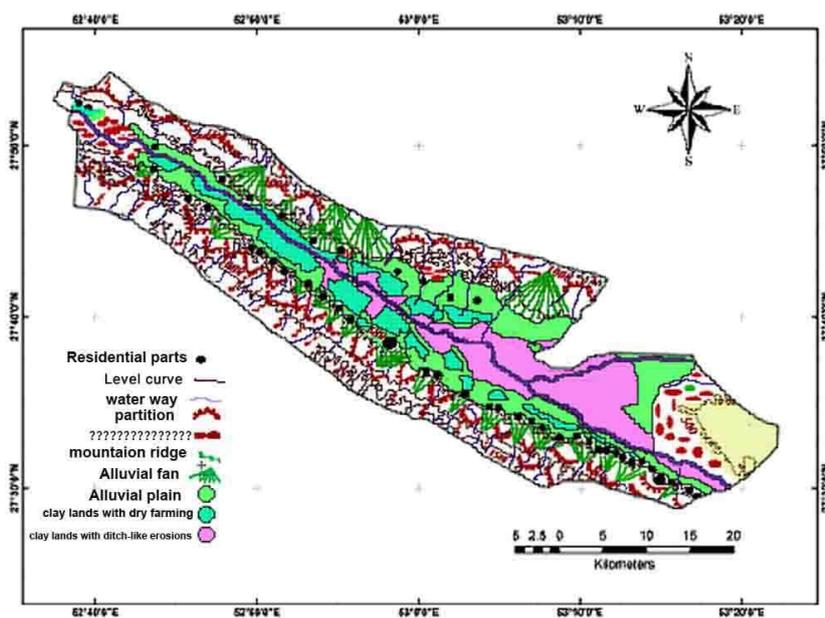


Figure 5: Geomorphologic map of Allamarvdasht

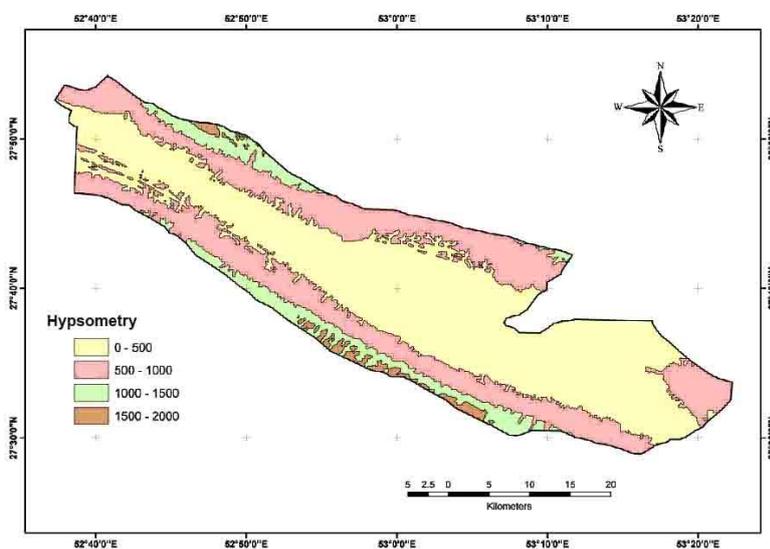


Figure 6: Map of hypsometry of Allamarvdasht district

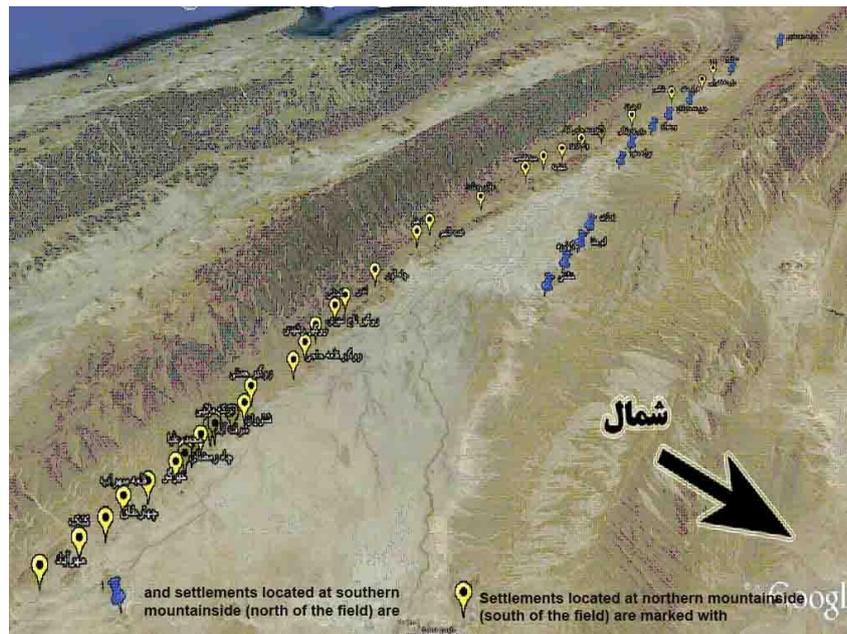


Figure 7: Location of settlements proportional to mountainside directions in Allamarvdasht district

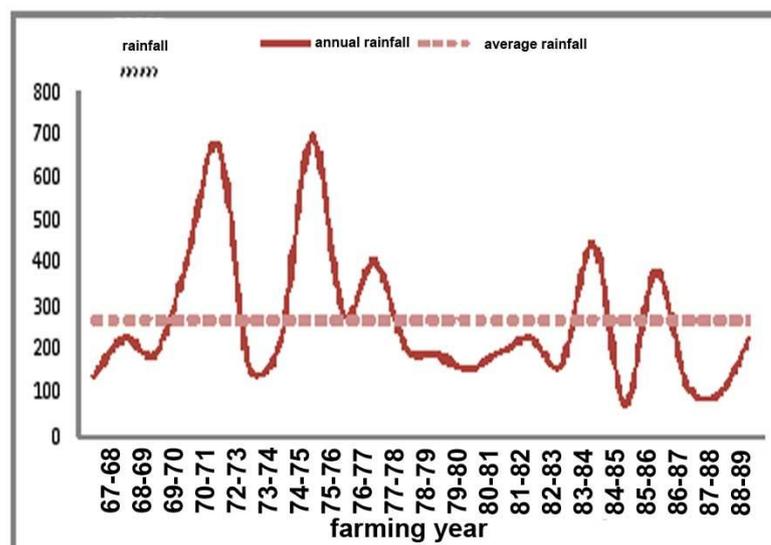


Figure 8: Diagram of annual rainfall variations in Allamarvdasht with an average duration of 22 years (1367-1389)

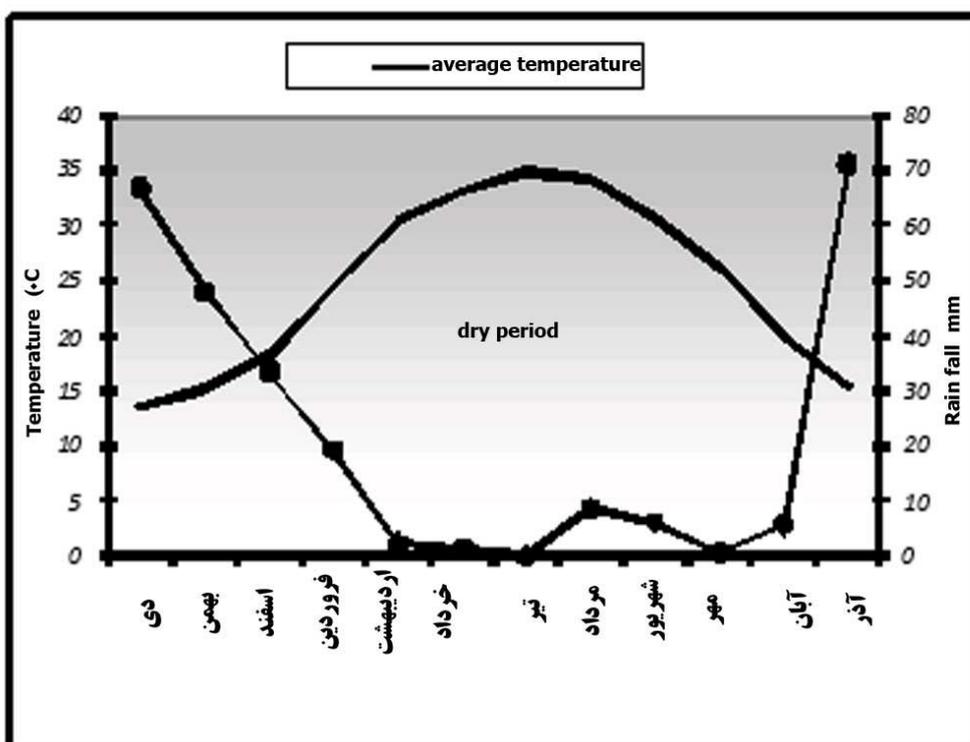


Figure 9: Ombrothermic diagram of Allamarvdasht (determination of dry and humid periods)

Hydrology:

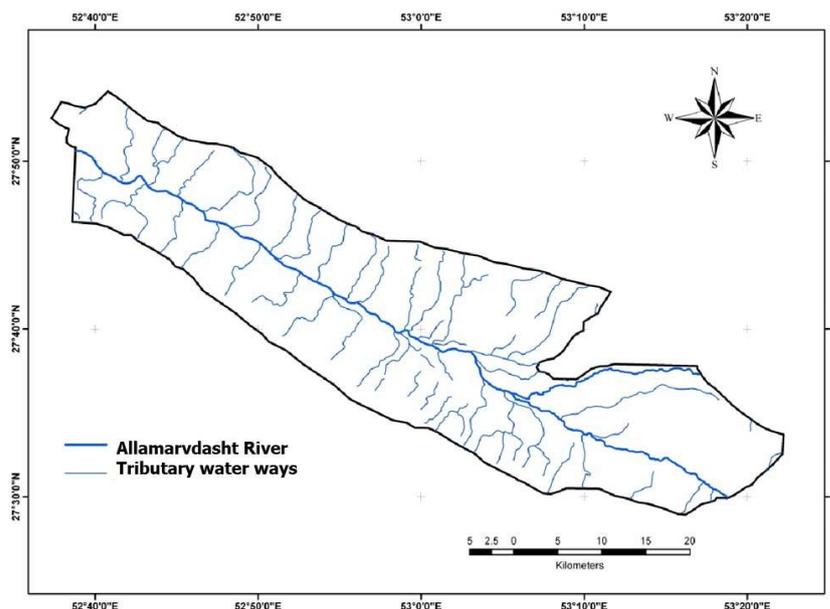


Figure 10: Map of drainage network of Allamarvdasht district



Figure 11: Satellite picture of extension of ditch-like erosions in Allamarvdasht

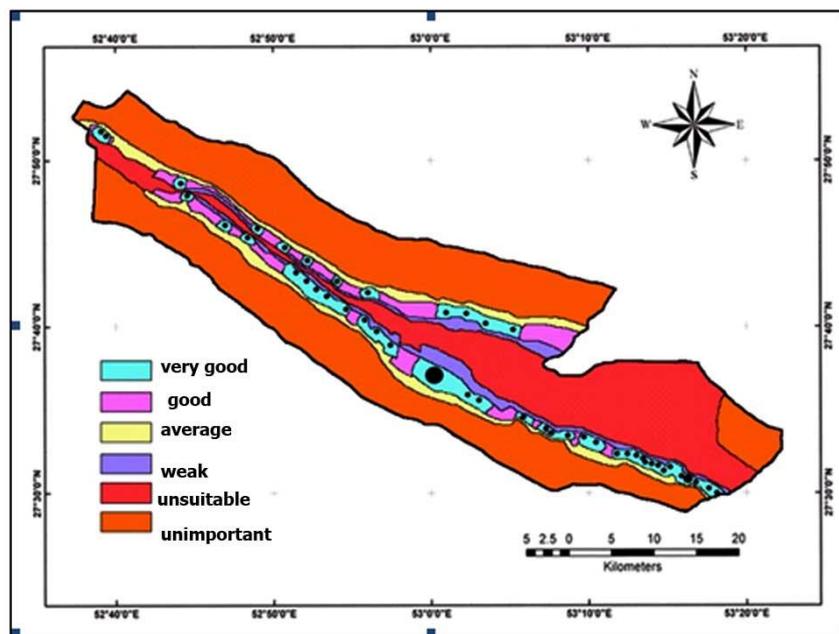


Figure 12: Zonation map of developmental capacities of settlements of Allamarvdasht district

CONCLUSION AND SUGGESTIONS

Geomorphologic condition of Allamarvdasht district has directly

influenced on the establishment and development of settlements in this region. Assessment of residential pattern in

Allamarvdasht district indicates a linear dispersion and establishment of most residential areas (over 90% of population) at southern half of the field and northern mountainside of Nar anticline (Varavi) due to a more suitable geomorphologic condition based on soil and water compared to southern mountainside of the field's northern anticlines. Despite having a very low gradient, uneven areas have not been able to provide necessary conditions for the settlement of population in the same way as mountainside fields due to lack of proper depth of soil, heavy soil texture, lack of suitable drainage and salinity of low level fields. The most important actions and suggested guidelines that can be directly and indirectly effective on the improvement of settlement conditions of Allamarvdasht district are expressed as follows:

- Provision of a comprehensive watershed plan and enforcement of watershed operations in the region in order to conduct runoffs, facilitate their penetrability, reinforce ground aquifers, and prevent soil erosion.
- Exploitation of potential calcareous hydrologic-based resources especially at southern highlands of Allamarvdasht field

- Precise observance of conductive rural and comprehensive urban plans for a systematic development of settlements

REFERENCE

- [1] Este'laji, Ali Reza & Qadiri Ma'sum, Mojtaba (1384); Assessment of Geographical factors in the Establishment system of settlements Based on Quantitative Techniques (A case study: Vilkgage region of Namin Township suburbs), Periodical of Geographic Resarches. Vol .No.53, pp. 121-136.
- [2] International Research Center of Seismology and Earthquake Engineering, (1389); maps & statistics of Iranian earthquakes, <http://www.iiees.ac.ir/>
- [3] Khayyam, Maqsd, (1385); Fundamentals of Geomorphology, written by Max Drive, 7th edition, Tehran, Mabna publications.
- [4] Office of Water Resources Research, (1363); reports on geo-electric studies of Lamerd and Allamarvdasht regions, Fars Regional Water Supply Organization.
- [5] Rajaei, Abdol Hamid, (1373), Function of Geomorphology in land logistics and Environmental

- Management, 1st edition, Tehran, Qumes Publications.
- [6] Fars Regional Water Supply Organization, (1364); reports on water resources studies of Allamarvdasht region, water resources studies of Fasa Research Center.
- [7] Iranian Organization of Geologic and Mineral Expeditions, (1384); geologic maps of 1: 100,000, Khonj, Shirino, and Gavbandi's sheets (incorporated with marginal reports).
- [8] Iranian Meteorological Organization, (1389); rainfall statistics of Allamarvdasht Pulviometric Station.
- [9] Saeedi, Abbas, (1377); Fundamentals of Rural Geography, Tehran, SAMT Publications.
- [10] Seidaee, Seyyed Skandar & Nowrouzi Avargani, Asghar, (1389); Analysis of Spatial Establishment Patterns of Rural Settlements in Chaharmahal & Bakhtiari Province, Periodical of Geography and Development. Vol .No.18, pp. 53-68.
- [11] Qadiri, Ma'sum, Mojtaba et al., (1386); Assessment of the Relation between Geographic Fundamentals and Dispersion of Rural Settlements in Arid Regions (A case study: Khur District and deserts of Naeen Township), Research Magazine of Humanities of Isfahan University. Vol .No.24, pp. 124-109.
- [12] Gudarzi Nejad, Shapur, (1377); Geomorphology and Environmental Management, 1st. edition, Tehran, SAMT Publications.
- [13] Agricultural Jihad Watershed Management, (1380); Assessment of Land Use Improvement of Chah Eini Watershed in Fars Province, Assessment Domain and Geographical Information of Agricultural Jihad Watershed Management of Fars Province.
- [14] Moqimi, Ebrahim, (1388); Urban Geomorphology, 3rd edition, Tehran, Tehran University Publications.
- [15] Pooyesh Nou Avar consultant engineers, (1382); Hadi Design of Allamarvdasht, 1st. and 2nd. Phases, Pooyesh Nou Avar consultant architects and city designers.
- [16] Consultant engineer – Haseb Karaji, (1386); Functional studies of the management of Allamarvdasht arid regions in

Lamerd, 1st Volume (basic studies), Natural Resources and Watershed General Organization of Fars Province, Department of Desert Affairs.

[17] Negaresh, Hossein, (1382); Function of Geomorphology in the Locations of Cities and Their Outcomes, Periodical of Geography and Development. Vol . No. 1.