

Evaluation of the Obstacles against the Economic Development of Cihanbeyli Rural Area

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Abstract

Cihanbeyli, located in Salt Lake (SL) Basin, is the largest county of Turkey in terms of its area. In total 56.105 people live in the county and its rural population is 7.005. According to data of 2011 year, Cihanbeyli's social development level is at the tenth of 31 counties of the Konya province and the county is among the least developed counties' group. SL basin is an important wetland in Turkey in terms of biodiversity conservation and international criteria. The most important economic activities in the area are agriculture, livestock and industrial salt production. All the cultivated land is reserved for dry farming and vegetable and fruit production is at negligible quantity. Lack of forested areas, existence of barren lands, insufficient water resources for the agriculture with the impact of the SL, Being one of the Turkey's low rainfall areas, transforming the domestic and industrial waste of Konya city directly to the SL's are the negative factors affecting the agriculture in the region. Depending on the threat of drought, significant productivity and quality issues are being experienced in the region's rural area. In the region agricultural production is decreasing due to drought and intense population immigration from the county's rural areas. Desertification caused by SL, furthermore aridity caused by manufacturers' improper fertilizer uses exist in agricultural areas. Range of products is limited as a result of unconscious agricultural production. Wheat, barley and sugar beet are the products commonly grown. By identifying the obstacles against the Cihanbeyli region's economy this study aims to determine sustainable strategies activate/improve agriculture as a main source of income, thereby improve economy of the region. Results are useful in i) referring agricultural activities to the areas have good physical and environmental conditions and may achieve maximum efficiency in countryside, ii) improving non-agricultural uses in the areas are unsuitable for agriculture and low efficient, iii) avoiding the construction and environmental pressures on suitable farmland.

Keywords: Agricultural efficiency, sustainable economic development, Cihanbeyli, Salt Lake Basin, Q01, Q15, Q18

1. Introduction

Sustainable development links to a rationalistic and effective use of resources. Presently, growth in human needs for a variety of reasons causes a great pressure on the existing resources, which has induced in misuse-based deterioration of lands as well as increase in poverty and several kinds of social problems (1).

Nowadays, the need for optimum use of land is extremely greater than ever due to rapid population growth and urban expansion which turn land into a relatively scarce commodity for agricultural and rangeland uses. Therefore, an increasing urgent need to match land capabilities and land uses in the most rational possible way is essential. For this purpose, maximization of sustainable production as well as satisfaction of the diverse needs of society can be applied as the most appropriate solutions (2).

Yet good quality agricultural land is a limited resource is under threat from a variety of sources. Urbanisation and land degradation alienate and deplete agricultural land resources. The reduced availability of lands highly suited to agricultural production reduces the sustainability of existing agricultural systems and encourages the use of more marginal lands for agriculture (3). Thus land suitability analyses are essential to enable the sustainability of land resources and also efficiency at agriculture via; i) referring agricultural activities to the areas have good physical and environmental conditions and may achieve maximum efficiency in countryside, ii) improving non-agricultural uses in the areas are unsuitable for agriculture and low efficient, iii) avoiding the construction and environmental pressures on suitable farmland.

Strategies about the optimal use of the region's agricultural potential are developed in this study, which aims to support the sustainable rural development and to contribute to the increase the people's income levels and qualities of life in Cihanbeyli against the global climate change

2. Case Study Area: Cihanbeyli County

Cihanbeyli is located in the central part of "Central Anatolia Region" between 32-34 degrees east longitude and 38-39 degrees north latitude. Cihanbeyli located at 100 km north of Konya city is the largest district of Turkey with its approximately 4.109 km² area (Figure 1). There are Salt Lake and Aksaray County at the east, Yunak and Sarayönü counties at the west of

Cihanbeyli. Cihanbeyli is surrounded by Altınekin counties at the south, Kulu and Haymana (Ankara) counties at the north. The county has 46 connected districts¹.

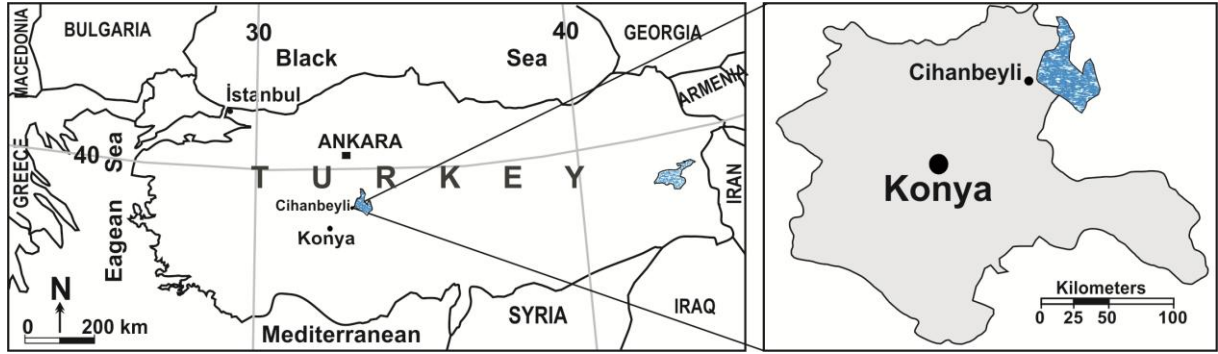


Figure 1. Location map

Cihanbeyli is like the continuation of Konya Plain extending northward. County shows wide plateaus feature. The plains are usually between 950 and 1.000 meters surface height from the sea. Plateau portions exceed 1.000 meters above sea level (4).

2.1. Socio-economic structure

In the study area, agriculture is the main source of livelihood of the population. Cihanbeyli's economy is based on agriculture, livestock and industrial salt production. Salt Lake, which is the second largest lake in Turkey and provides 40 % of Turkey's salt needs, is located in the boundaries of the district. In addition, soda, soap and sodium salt deposits, used in the production of leather and paint, are available Gölyazı, Günyüzü and Yapalı neighbourhoods. Salt is produced in Yavşan Saltpan, which is 22 km away to the county and located at the west of Salt Lake. Salts derived in the region is being processed and refined in modern factories and presented to the market. Salt and sodium sulphate are produced in Tersakan and Bolluk lakes, secondly leonit fertilizer, which is produced for the first time in Turkey, is produced in Bolluk Lake (5).

According to the data of 2004 (6) Cihanbeyli county's Socio-Economic Development Sequence (Development Index: -0.38724, Group 4) is 535 among the 872 districts in Turkey. According to the Mevka's (Mevlana Development Agency) socio-economic development index assessment (2011), Cihanbeyli ranks at 10th of 31 counties in the province of Konya in

¹ Ağabeyli, Ahirigüzel, Atçeken, Bahçelievler, Beylioiva, Böğrüdilik, Bulduk, Büyükbeşkavak, Cumhuriyet, Çimen, Çölyayla, Damlakuyu, Gemecik, Göktepe, Gölyazı, Günyüzü, Hodoğlu, İnsuyu, Kale, Kandil, Karabağ, Karatepe, Karşıyaka, Kayı, Kelhasan, Kırkişla, Kocatepe, Korkmazlar, Köprübaşı, Kuşça, Küçükbeşkavak, Kütükuşağı, Mutlukonak, Pınarbaşı, Sağlık, Sığırcık, Taşpınar, Turanlar, Tüfekçipınar, Uzuncayayla, Üzerliktepe, Yapalı, Yeniceoba, Yeşilöz, Yünlükuyu, Zaferiye (5)

terms of social development and takes place in the group 4 developed districts. County's population is in group 4 (Table 1, Table 2, and Figure 2).

Table 1. Variables used in the evaluation of socio-economic development index (7)

Year	Variable	Unit	Value
2010	The illiteracy rate	percent	8.09
2010	6 + female literacy rate	percent	83.01
2010	High school + graduated rate	percent	2.50
2010	The number of students per classroom at preschool	person	40
2010	Number of students per classroom at elementary	person	26
2010	Number of students per classroom at secondary	person	26
2010	Total population	person	60917
2010	Urban population ratio of the total population	percent	25.85
2010	Population density	person	16
2010	The population growth rate	per thousand	-30.35
2010	The divorce rate	percent	4.06
2008	Total age dependency ratio	percent	52.42
2011	The number of active associations	number	39
2009	The crude birth rate	per thousand	17.22
2009	The infant mortality rate	per thousand	16.21
2009	Stillbirth rate	per thousand	8.58

Table 2. Socio-economic development index values of Konya province's counties (7)

Rank	County	Socio-economic development index value
1	Selçuklu	3.5421
2	Meram	2.5848
3	Karatay	1.9017
4	Ereğli	1.1186
5	Akşehir	0.8336
6	Seydişehir	0.8011
7	Kulu	0.2879
8	Karapınar*	0.2794
9	Beyşehir*	0.2794
10	Cihanbeyli	0.0295
11	Ilgın	0.0122
12	Altınekin	-0.0175
13	Çumra	-0.0613
14	Sarayönü	-0.0668
15	Kadınhanı	-0.1502
16	Hadim	-0.2252
17	Güneysınır	-0.2397
18	Yunak	-0.3280
19	Emirgazi	-0.4221
20	Çeltik	-0.4654
21	Doğanhisar	-0.5155
22	Yalıhüyük	-0.5337
23	Halkapınar	-0.5394
24	Akören	-0.6409
25	Bozkır	-0.6546
26	Hüyük	-0.7751
27	Tuzlukçu	-0.8071
28	Taşkent	-0.9343
29	Derbent	-1.0361
30	Ahırlı	-1.0458
31	Derebucak	-1.1735

* Karapınar and Beyşehir have same socio-economic development index values.

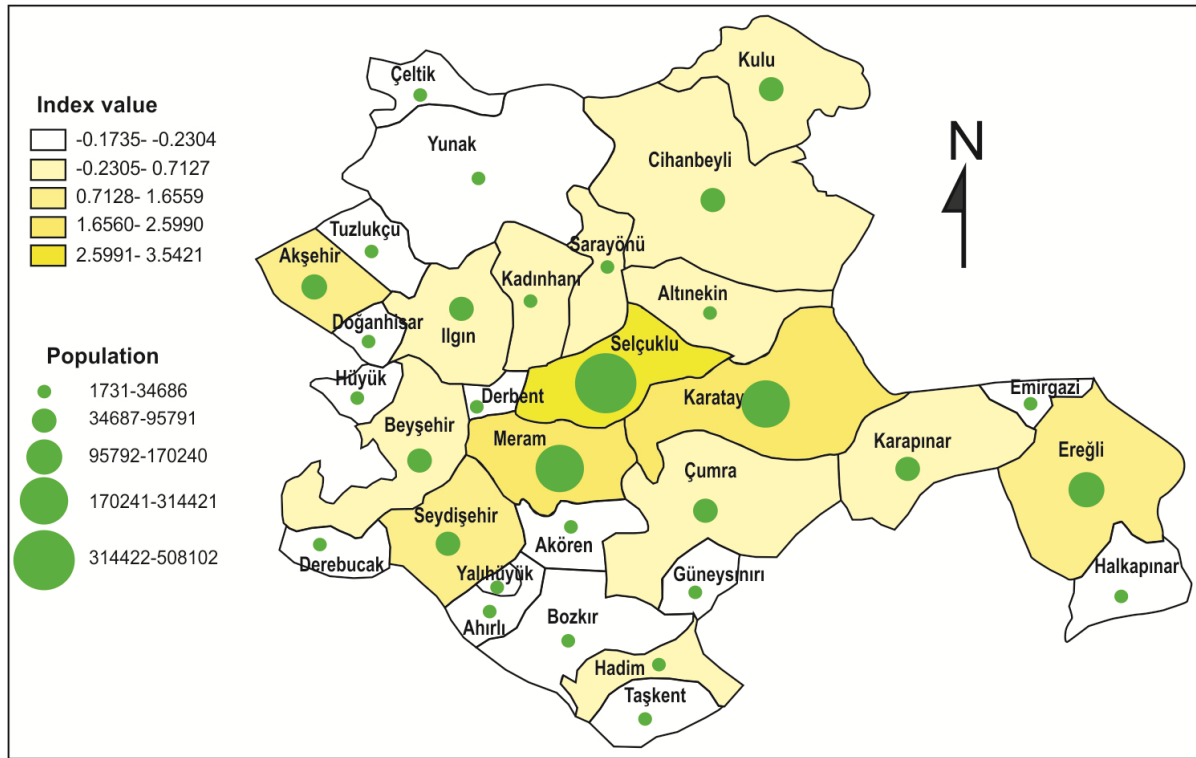


Figure 2. Socio-economic development index values of Konya province's counties (adapted from 7)

According to data from the year of 2012, the total population is 56.105. Its 49.100 percent live in the county centre, while 7.005 live in the bound provincial neighbourhood (4, 5). The migration, due to lack of income, shortness of job opportunities and social needs, from Cihanbeyli to Konya city centre or to other provinces is an important socio-economic problem. County's population cannot be kept sufficiently in the rural. Besides, a significant portion of the county's population works in various European countries.

2.2. Agricultural structure

Konya is a very important agricultural city covering the 10 % agricultural area of Turkey with its 2.617.908 hectare land (8). Cihanbeyli is one of the counties where dry farming is intensive in Konya. The cultivated land of Cihanbeyli County is 219.992 ha, while this area covers 9.79 % of Konya's cultivated land and 53.51 % of the Central Anatolian Basin. All cultivated land in the county is allocated for field cultivation while fruit and vegetable production is at negligibly low level. The products are widely being grown are wheat, barley, corn, peas, sugar beets, lentils, cumin, sunflower and legumes. Modern technology is largely used in agriculture (5, 9). Cihanbeyli's existing agricultural structure is evaluated under the headings of land use, soil type& structure, climate, topography, agricultural water use and the problems of agriculture.

2.2.1. Land use

Cihanbeyli's rural regions are less rugged terrain and generally have a flat topography. The area contains the western part of Salt Lake, and Bolluk and Tersakan Lakes. Salt Lake's surroundings, east of Taşpınar and Sağlık's surroundings consist of bare and barren land. The elevations between Kandil and Kuşça are bare land. There are marshes around the lakes, especially south of Lake Tersakan. However, most of these marshes have dried up in recent years, and the present marshes dry during the summer months. The only orchard in the area exists in a small area at the south of Böğrüdelik. Industry and commerce are not much developed in Cihanbeyli. Small-scale trade is carried out in the downtown. Meadows located at the east of Cihanbeyli are salty and poor in terms of grass quality. Grass species, which are not being preferred by animals, commonly exist in this area. A large portion of the area is agricultural land and the majority of these agricultural lands are non-irrigated (Figure 3).

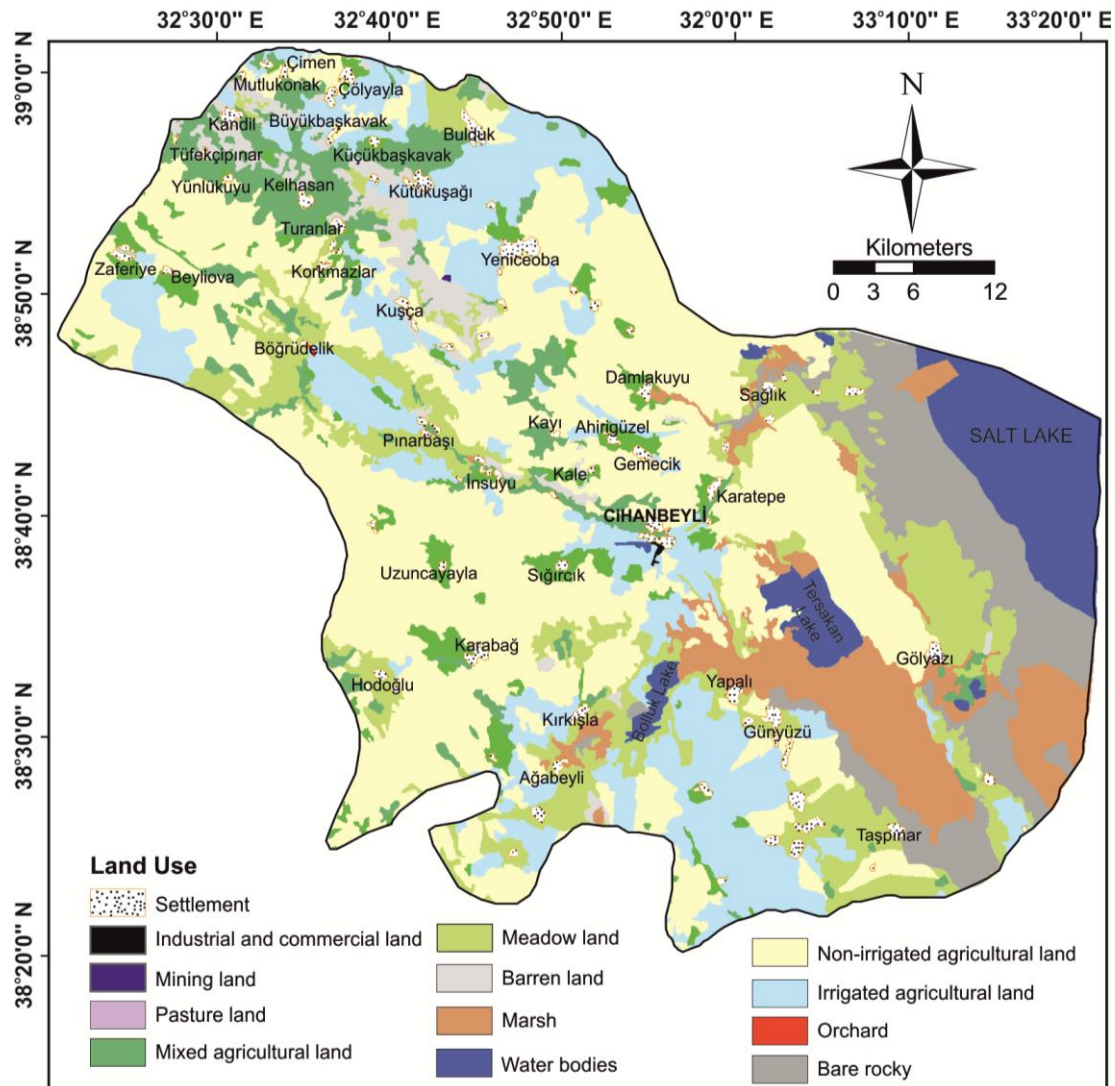


Figure 3. Land use map of Cihanbeyli County

2.2.2. Soil type & structure

There are *hydromorphic soils* at Tersakan Lake's surroundings and the south of Salt Lake. These lands are not suitable for agriculture because they are constantly moist. In this kind of soils organic material content, salt and alkalinity is high.

Colluvial soils, the young soils formed from parts of the surrounding rocks, present at the area in a scattered manner and are observed in a small amount. *Colluvial* soils are not suitable for agriculture due to their presences at the hill edges which have high the slopes.

The west of Cihanbeyli is almost entirely covered with *brown soil* (Figure 4). In the formation of brown soil calcification plays role, therefore it has very high calcium content. In this soil type Neocene lake sediments and schist, occur from the limestone, marl, sandstone, claystone, clayey limestone, constitutes the host rock (10). Chemical and biological activities slow down in this soil type when they remain dry for long periods of summer. These lands which have variable thickness are more suitable for non-irrigated agriculture.

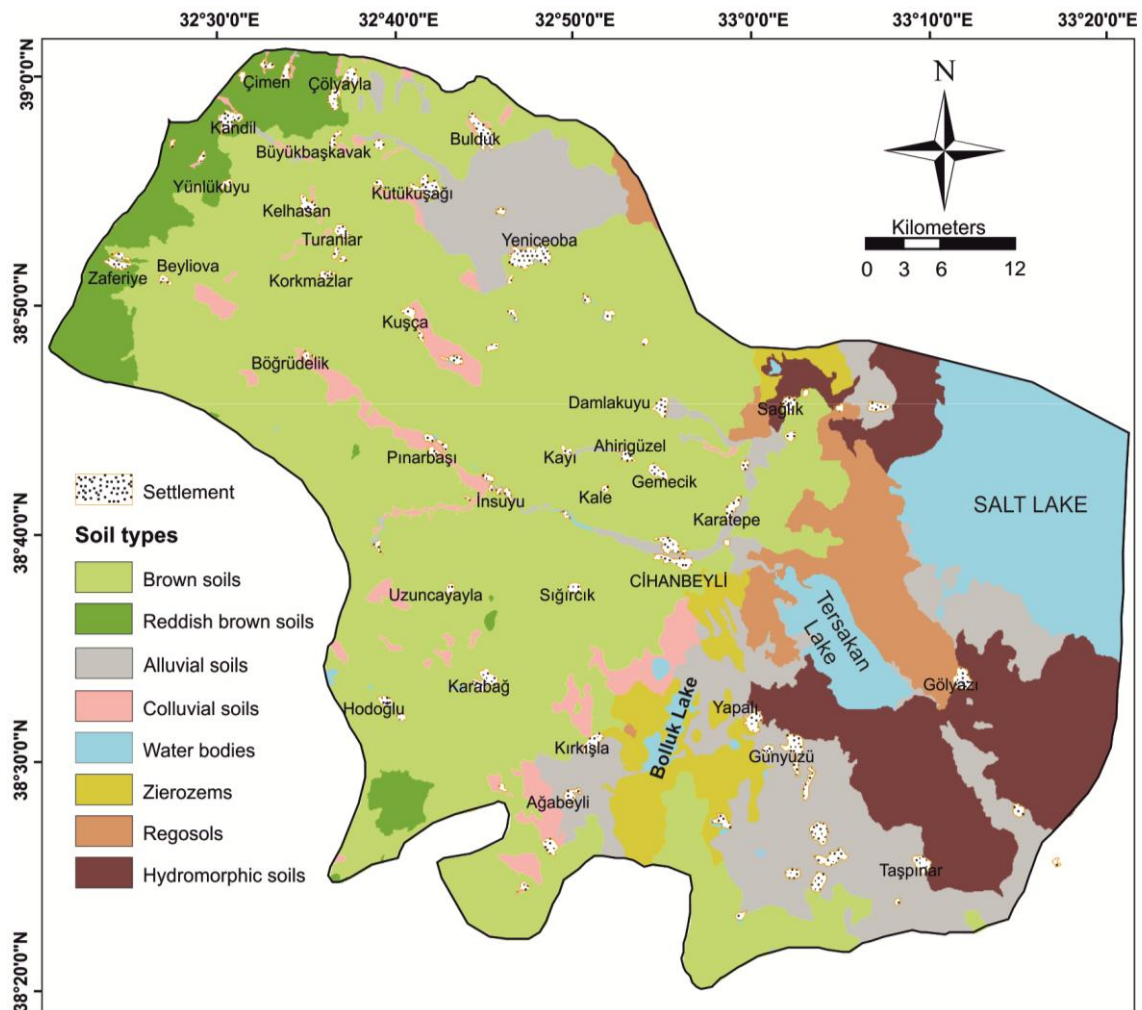


Figure 4. Soil type map of Cihanbeyli County

Reddish-brown soils are observed in the rugged terrain at western edge of the area usually are not thickness due to their presences on the sloping terrains. The main substances are mostly limestone and old gravel deposits. Non-irrigated agriculture may be applied in the areas which have not high slope.

Siorezem soils which were formed as a result of calcification are observed in a narrow area around the Bolluk Lake and at the southeast of Cihanbeyli. Siorezem soils, composed of grained rocks with high content of calcite, are not suitable for agriculture (10).

Regosol soils, consisting of unconsolidated material derived from freshly deposited alluvium or sands, located in the areas between Tersakan Lake and Salt Lake (10). Regosols are not suitable for agriculture.

Alluvial soils, located along İnsuyu, around of Yeniceoba and commonly south of the lakes in the area, are young and deep soils composed deposits which are originated of rivers and lakes (10). These soils are rich in organic matter content areas and constitute the most favourable areas for agriculture.

2.2.3. Climate

The study area has a semi-arid climate with cold winters and moderate to hot summers. Generally, at the higher topographic elevation rainfall is the more. Rainfall occurs mainly in the wet period, with the maximum in December and January. Generally, the lowest rainfall is recorded in July and August (11). The long-term average annual precipitation in the region between the years of 1990-2010) is 312.8 mm and the average temperature is 11.69 °C. However, annual rainfall for plant growth in the region is inadequate due to usually annual rainfall of 400 mm is being considered suitable for plant growth (12).

2.2.4. Topography

Elevation of the study area ranges between 900 m and 1.350 m above sea level. Elevation ranges from 900 to 1.000 m except Kütükuşağı, Kandil and Kuşça's surroundings located in the northwest of the region and some hills in the southeast (Figure 5). The elevation is considered as an important factor for the land's suitability to agriculture because of its effect on climate and vegetation. In the region the areas have elevation from 900 to 1.000 m are suitable for agriculture.

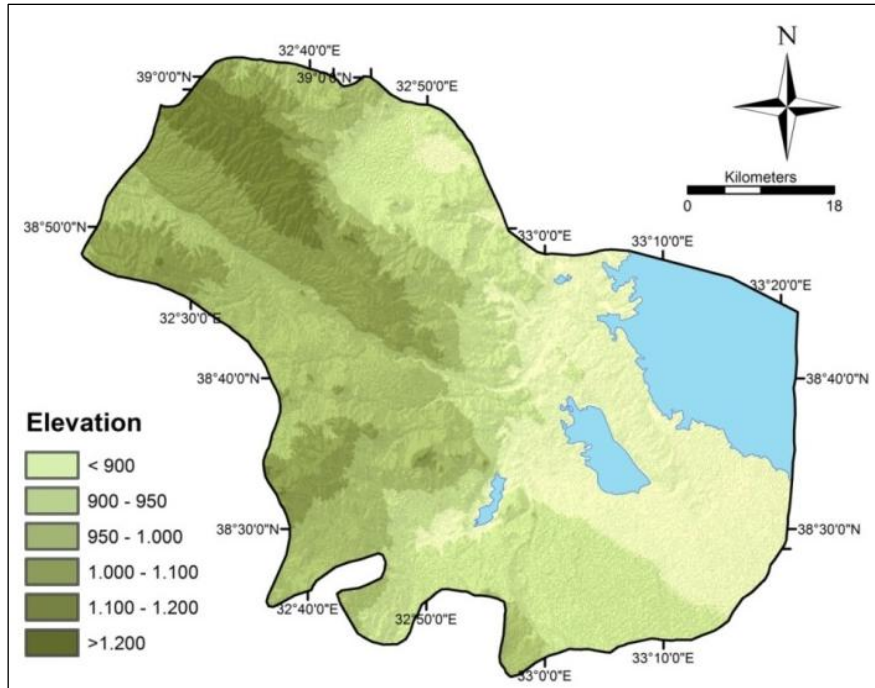


Figure 5. Elevation map of Cihanbeyli County

Places with high slope are generally not suitable for agricultural land use. To carry out the transportation and agricultural operation in an effective manner is extremely important to efficient use of agricultural land. Otherwise, the cost and the labour force will be greater, so the expected yield could not be achieved. Cihanbeyli's rural area generally has a flat structure and is less hilly. Slope values of the region are between 0-30° % values, additionally 85 % of the land has slope values 0-6° % (Figure 6). Hence, the region is quite appropriate to agricultural land use.

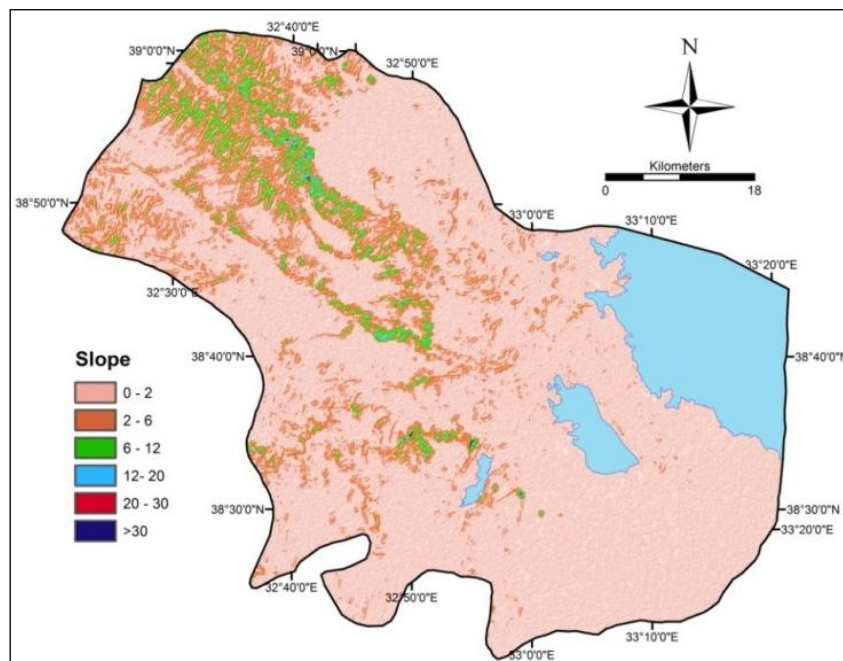


Figure 6. Slope map of Cihanbeyli County

2.2.5. Agricultural water use

Cihanbeyli is poor in terms of rivers for its being located in one of the lowest rainfall areas of Turkey. River network is undeveloped in the region due to existence of less rugged terrain. İnsuyu, which is the region's only water streams stream, is connected to the Cihanbeyli dam and its gathered water is used for irrigation. But in recent years the dam has come to threshold of dry. Flow rate of the stream has reduced depended on the trout farm established on the stream and excessive water withdrawal for irrigation, thus İnsuyu's reaching to the Salt Lake is blocked.

Irrigation is basic and indispensable factor to increase agricultural production and guarantee in arid and semi-arid regions (13). The problem to find quality water at sufficient amounts for irrigation in arid regions often leads to use of groundwater containing excessive soluble salts and chlorine component. Increasing soil and water salinity reduces usefulness of soil water; causes reduction in germination, plant growth and yield (14).

As a consequence of limited and unavailable surface water for irrigation purposes in Cihanbeyli region agricultural production heavily relies on groundwater irrigation. The quality of groundwater for irrigation is an important factor for the agriculture as availability to water. Groundwater is overly salty and not suitable for irrigation particularly at the east of Cihanbeyli. Temperature of groundwater around Bolluk Lake is between 20-49 ° C and its ion content is high. Therefore, used ground waters in this region have bad quality for the purpose of agriculture and negatively affect product yield. Both non-irrigated and irrigated farming is practiced on the flat areas around Yeniceoba. Groundwater quality is decreasing, due to the lithological pollution, especially towards the east (15).

2.2.6. Problems of agriculture

A large proportion of the land's being barren, the lack of forested areas, lack of water resources, groundwater withdrawal, and unfavourable water resources for agriculture are the factors adversely affecting the agriculture in the region. The areas, which are suitable for agriculture, are faced with adversities of the impact of the Salt Lake and having low qualified and on a limited scale ground water reserves for agricultural irrigation. In addition, as a result of the increase in temperature due to global warming, evaporation in the region has risen above 90 %. So the rain evaporates without feeding the aquifer. All these drawbacks have led to a decrease in ground water of the region about 10 m in recent decades. The region's rural area exhibits an agricultural structure experiencing significantly yield and quality problems

depend on threat of drought. Despite the fact that farmers are innovative, the production range is limited due to their unconscious activities. The area is concerned with an aridity arisen from wrong fertilization besides the aridity of Salt Lake. Cultivation of agricultural land is decreasing due to intense immigration from rural areas to outside of the county as well as drought.

The main problems faced in agriculture of the region can be summarized as follows:

- Limited irrigation of agricultural lands and to leave the agricultural fields to fallow,
- Use of surface irrigation commonly and not using modern irrigation techniques,
- No irrigation facilities in barren lands,
- Failure to provide diversity in agriculture,
- Decrease in the willingness of agriculture and animal husbandry due to economically well being of people who have migrated to abroad,
- Insufficient conscious level of farmers,
- Undeveloped industry depending on agriculture sufficiently,
- Aridity arisen from unconsciously usages of pesticides and fertilizers,
- Due to intensive surface irrigation fall of ground water levels till below the level of Salt lake,
- Giving up agriculture and animal husbandry of people due to getting low-income,
- Left residential sewage into leave Salt Lake without any reclamation, and
- Obtaining irrigation water from the drainage channel, moves domestic and industrial waste of Konya city into Salt Lake, without any reclamation.

3. Results and Suggestions

Current agricultural land and the suitability level of soil to agriculture are handled to assess the agricultural efficiency in the study area (Figure 7, Figure 8). Salt Lake's near surroundings, south of Tersakan Lake, the area between Tersakan and Bolluk Lakes and the south-west of Bolluk Lake are not used for agricultural purposes. Besides residential areas, mountainous areas and bare rocks are the no-agricultural areas in the region. Pastures are located in narrow spaces scattered in the western part of the Cihanbeyli County. Non-irrigated agriculture is performed in a large part of the area while Yeniceoba plain, south of Böğrüdelik and southeast of Bolluk Lake constitutes the majority of irrigated agriculture areas.

Soil types, which are not suitable for agriculture, such as siorezem, regosol and hydromorphic soils are dominant especially at the surroundings of the lakes. Reddish-brown soils, especially observed at the west in the rugged terrain of the area, are not very favorable for agriculture due to their presences on the sloping terrains and having not more thickness. Brown soils, which are more suitable for non-irrigated agriculture, constitute a large part of the region. Alluvial soils, the most suitable soil type for agriculture, mostly observed in Yeniceoba plain, between and south of Bolluk and Tersakan Lakes, along with İnsuyu stream and southwestern edge of the Salt Lake.

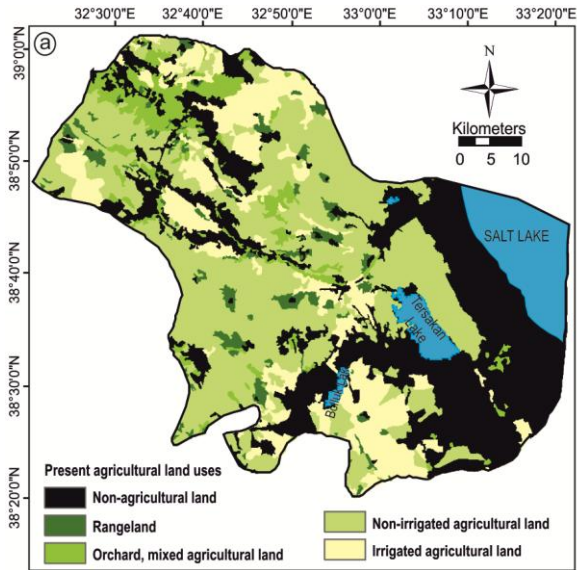


Figure 7. Present agricultural land uses

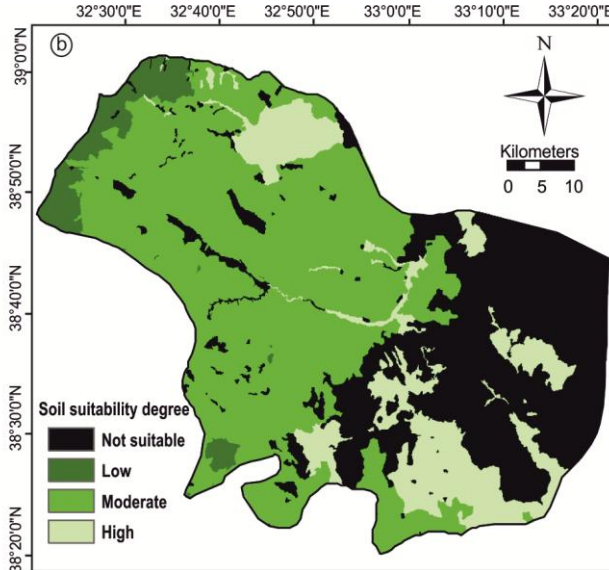


Figure 8. Agricultural land suitability in respect of soil type

According to the agricultural efficiency map (Figure 9), which was prepared utilizing current agricultural land and the suitability level of soil to agriculture, irrigated agriculture is generally being performed in alluvial soils which also have high agricultural efficiency in the study area. But it is determined that the areas around the Salt Lake, where suitability degree of the soil is quite high to agriculture, are not used for agricultural purposes. Also in some of the areas between Tersakan and Salt Lakes agricultural efficiency is low despite non-irrigated agriculture is being performed. Agricultural efficiency level is at medium and high level in some of the areas at the south of Tersakan Lake and at the southwest of Bolluk Lake.

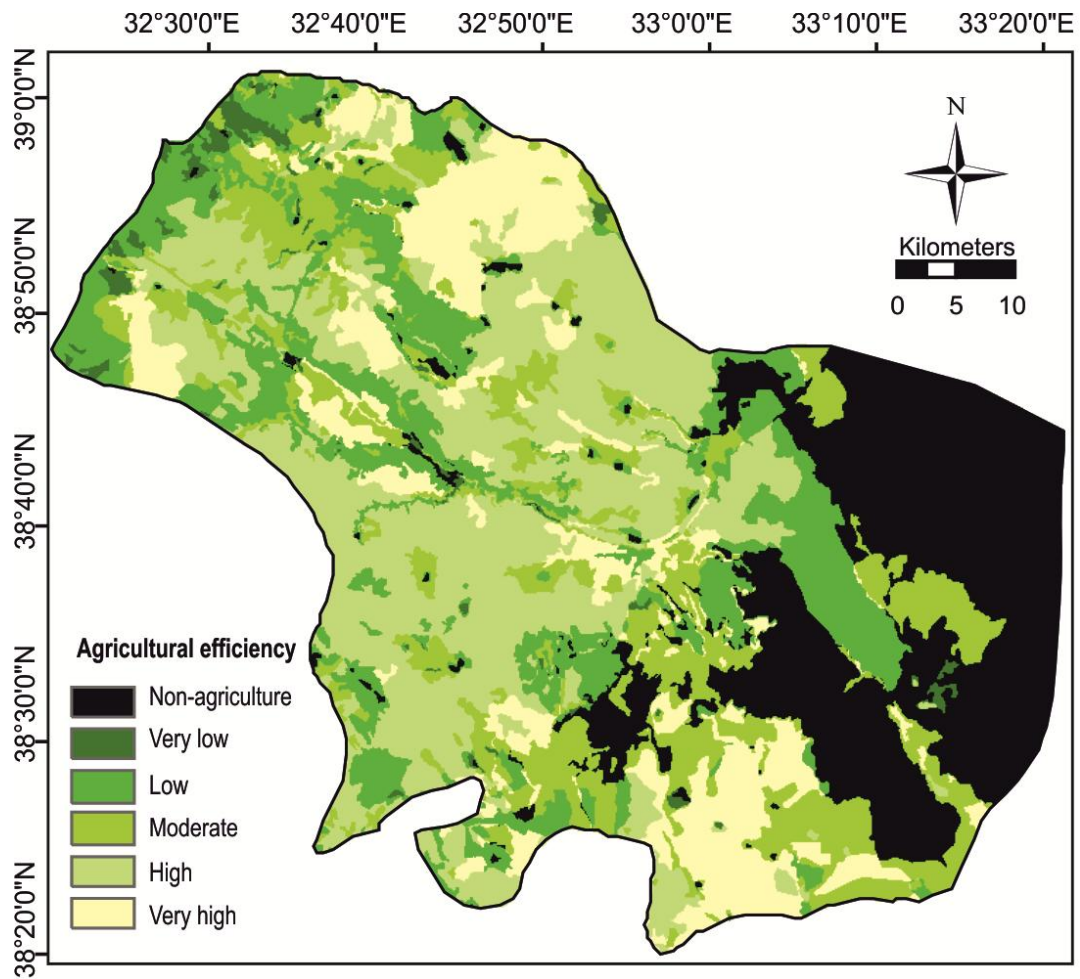


Figure 9. Agricultural efficiency map

Rising temperatures in the region have triggered more intensive droughts. Environmental disadvantages (such as water scarcity, scarcity of rich soil, etc.) and climatic adversities furthermore wrong agricultural practices and losses of rich soil result in a serious decline in agricultural production. Therefore, activation of agricultural structure in the region and the adoption of environmentally friendly farming practices are keys of Cihanbeyli's, of which the economy is based on agriculture, socio-economic development (rural development). In this context the following strategies should be adopted to activate agriculture in the region on the basis of the sustainability of natural resources, thus to improve economy of Cihanbeyli:

- Uses of soils have high agricultural efficiency for the purpose of agricultural production and planning non-agricultural land uses in areas have low agricultural efficiency,
- To ensure effective and efficient use of soil structure via proper farming techniques in agricultural areas of the region,
- Land use planning should be based on the efficient use of soil resources,

- Determination of climate conditions and possible climate changes on the basis of agricultural sub-regions,
- The determination of appropriate crop patterns on the basis of agricultural sub-regions,
- In order to gain saline soils, which are unsuitable for agriculture, to organise studies on determination and rehabilitation of saline soils,
- To increase the production of crops have shortage of supply and are appropriate to the region's agricultural crop pattern to prefer the crops have high relative profitability in agriculture (9),
- Performing the agricultural activities according to the principles of sustainable production, high efficiency and profitability,
- To create an agricultural structure is highly competitive,
- To develop agricultural and non-agricultural economic activities oriented human resources, thus to diversify economy in rural of county,
- To provide employment opportunities for the rural population and the agricultural-based industries will be established in rural areas of the county, thereby to prevent migration,
- To evaluate local potential and resources; to improve and sustain working and living conditions of rural society,
- To ensure efficient use of water by expanding modern irrigation methods in the region's agricultural areas,
- To prioritize and maintenance the efficient use of water resources through water-saving in agriculture,
- To make water sensitive improvements in irrigation infrastructure,
- Dissemination of pressurized irrigation systems,
- To transform surface irrigation methods into sprinkling and / or drip irrigation systems,
- To prevent illegal and unconscious use of groundwater,
- To prevent contamination of underground and aboveground water sources,
- To promote the use of waste waters after purification
- To implement programs for producers for efficient and sustainable uses of soil and water resources,
- To adopt water-sensitive crops,
- To adopt the concept of "precision agriculture", provides optimum efficiency by minimizing inputs in crop production, takes the spatial and temporal differences into account in the field according to the characteristics of plants and soil, thus enables more

efficient and environmentally friendly uses of inputs such as seeds, fertilizers, pesticides, etc. (16),

- To develop and disseminate the uses of drought-tolerant and high-yielding seed types and improve the efficiency, in this context to increase the cultivation of cumin and sunflower (9),
- To actuate the potential of livestock (cattle and sheep) in the region; in this context to increase roughage production, to support modern enterprises, to ensure the rehabilitation, protection and use of meadows, and
- To make tourism investments will regenerate the economy of the region also will keep the county's population living abroad, in the county in summer.

By identifying the obstacles against the Cihanbeyli region's economy this study determined sustainable strategies activate/improve agriculture as a main source of income, thereby improve economy of the region. Results are useful in referring agricultural activities to the areas have good physical and environmental conditions and may achieve maximum efficiency in countryside; improving non-agricultural uses in the areas are unsuitable for agriculture and low efficient; and avoiding the construction and environmental pressures on suitable farmland. The factors affect the agricultural efficiency will be analysed via Analytic Hierarchy Process (AHP), a commonly used multi-criteria evaluation method, and AHP-GIS based Agricultural Land Suitability Analysis will be applied to identify areas suitable for agriculture and will increase the agricultural productivity in future studies.

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